WORLD REVIEW OF THE *CAMPTOPTERA* GROUP OF GENERA (HYMENOPTERA: MYMARIDAE)

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Abstract   *Proc. ent. Soc. Ont.* 130: 21–65

The group of genera related to *Camptoptera* Förster is re-defined and five other genera are recognized: *Callodicopus* Ogloblin, *Camptopteroides* Viggiani, *Eofoersteria* Mathot, *Macrocamptoptera* Girault, and *Stephanocampta* Mathot. *Eomymar* Perkins, **syn. nov.**, is synonymized under *Camptoptera* and a lectotype is designated for its type species, *Eomymar muiri* Perkins. *E. maximus* Girault is transferred to *Mimalaptus* as *M. maximus* (Girault), **comb. nov.** *Paranagroidea* Noyes and Valentine, **syn. nov.**, is synomymized under *Camptopteroides* and its only described species is transferred to *Camptopteroides* as *C. verrucosa* (Noyes and Valentine), **comb. nov.** *Macrocamptoptera* is removed from synonymy under *Camptoptera* and its generic status re-established. *Herulia* Hedqvist, **syn. nov.**, and *Rhila* Donev, **syn. nov.**, are synomymized under *Macrocamptoptera* and their included species are transferred to *Macrocamptoptera* as *M. sundholmi* (Hedqvist), **comb. nov.** and *M. bulgarica* (Donev), **comb. nov.**, respectively. *Hadromymar* Yoshimoto, **syn. nov.**, is synonymized under *Stephanocampta* Mathot and its only described species is transferred to *Stephanocampta* as *S. masoni* Yoshimoto, **comb. nov.** *Staneria*, **syn. nov.**, is synonymized under *Camptoptera* and its only described species is transferred to *Camptoptera* as *C. diademata*, **comb. nov.** *Decamymar* Annecke, **syn. nov.**, is synonymized under *Callodicopus* and its only described species is transferred to *Callodicopus* as *C. magniclavae* (Annecke), **comb. nov.** *Camptoptera vasta* Girault is transferred to *Eofoersteria* as *E. vasta* (Girault), **comb. nov.** *Sphegilla franciscae* Debauche, *S. japonica* Taguchi, and *Wetanekiella brevicornis* Soyka are transferred to *Camptoptera* as *C. franciscae* (Debauche), **comb. nov.**, *C. japonica* (Taguchi), **comb. nov.** and *C.* **brevicornis** (Soyka), **comb. nov.**, respectively. A new subgenus, *Alalinda* Huber **subgen. nov.**, of *Camptopteroides* and two new species are described: *C.* (*Camptopteroides*) *alata* Lin from China and *C.* (*Alalinda*) *dorothea* Huber from North America.

Introduction

The worldwide mymarid genus *Camptoptera* Förster (1856) is one of about 13 classical genera of Mymaridae (those described before 1900, excluding currently recognized synonyms). The number of genera proposed up to the end of 1999 currently is 175, but with synonymy over the years this has been reduced to 104 recognized genera. Since Annecke and Doutt (1961) proposed the last formal classification of Mymaridae, dividing it into five tribes in two subfamilies, the tendency

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has been not to classify the genera at all because the tribes and subfamilies are most likely polyphyletic. Viggiani (1989) presented a considerably different grouping of the family based solely on male genitalia. Clearly, much work remains to be done to sort out generic limits properly and work out generic relationships more fully before a robust higher classification can finally be developed.

Camptoptera is the most speciose genus in a group of 13 nominal genera that we call the *Camptoptera* group. This informal generic grouping was proposed initially by Soyka (1961) but we define it more broadly based on examination of many more nominal genera than he did. We recognize six genera in the group and synonymize seven others. The features that different authors proposed to define their grouping of *Camptoptera* and related genera, or to permit their separation from other groups, vary. Until a detailed comparison of the same suite of characters across all the genera worldwide is made we consider it premature to accept a formal classification such as the Camptopterinae of Viggiani (1989). Such a classification should be based on well-founded apomorphies defining monophyletic groups, where possible. The *Camptoptera* group is likely monophyletic but single apomorphic characters or groups of characters have not yet been found that demonstrate this conclusively. The emphasis of this paper is, therefore, to clarify the genera within the group rather than demonstrate the monophyly of the entire group. This can only be done once related groups of genera are studied in more detail and character polarities determined with greater confidence. We discuss each genus of the *Camptoptera* group, update geographic distributions of the genera based mainly on specimens in the Canadian National Collection of Insects, describe a new subgenus and two new species of *Camptopteroides*, and provide a generic key.

Historical Summary

Over 50 years after *Camptoptera* was described two other related genera, *Macrocamptoptera* Girault (1910) and *Eomymar* Perkins (1912) from North America and Asia, respectively, were described. *Eofoersteria* Mathot (1966), *Stephanocampta* Mathot (1966), *Camptopteroides* Viggiani (1974), *Decamymar* Annecke (1961), *Staneria* Mathot (1966), *Paranagroidea* Noyes and Valentine (1989), *Hadromymar* Yoshimoto (1990), and *Rhila* Donev (1989) were described more recently but several of these names are synonymized below. Ogloblin (1955) proposed four new genera related to *Dicopus* and suggested that these should be placed in their own tribe. We add one of these genera, *Callodicopus*, to the *Camptoptera* group; the remaining genera belong in the *Alaptus* group, discussed briefly below.

Soyka (1961) included four genera in his "*Camptoptera* group": *Camptoptera, Stichothrix* Förster, *Macrocamptoptera*, and *Wertanekiella* Soyka. Annecke and Doutt (1961) classified three genera, *Sphegilla, Camptoptera* and *Eomymar*, in their tribe Ooctonini together with several other genera that are here considered to be not closely related to these. In his cladistic analysis of Holarctic genera, Schauff (1984: 25) included five genera, *Camptoptera, Sphegilla, Litus, Alaptus* and *Dicopus*, in his informal *Alaptus* group of genera but he deliberately did not propose a subfamily classification. We would modify his *Alaptus* group to exclude *Camptoptera* and probably also *Litus*. Based on their study of the New Zealand fauna, Noyes and Valentine (1989) proposed another informal group, "subgroup a" of their *Anaphes* group, included two genera in it, *Camptoptera* and *Paranagroidea*, and also deliberately omitted a formal subfamily classification. In a preliminary classification of subfamilies and tribes, Viggiani (1989) proposed the subfamily Camptopterinae and placed *Camptoptera* and *Camptopteroides* in it. None of these authors examined or included in their classifications more than three genera besides *Camptoptera*, usually because their work was regional. In Viggiani's (1989) case the classification proposed was based strictly on male genitalia.

Materials and Methods

Representatives of most of the genera discussed below are in the Canadian National Collection of Insects, Ottawa (CNCI). Material was also examined from the following collections:

ANIC   Australian National Insect Collection. J. Cardale
BPBM   Bishop Museum, Honolulu, USA. G. Nishida
FAU   Biological Control Research Institute, Fujian Agricultural University, Fuzhou, China. Lin N.-Q.
QMBA   Queensland Museum, Brisbane, Australia. C. Burwell
SANC   South African National Collection of Insects. G. Prinsloo
UCDC   University of California, Davis. S. Heydon
UCRC   University of California, Riverside. S. Triapitsyn
UPPH   University of Plovdiv "P. Hilendarski", Plovdiv, Bulgaria. A. Donev

Measurements were made from slide mounted specimens except for body length, which was from card or point mounted specimens. *Camptopteroides alata*, **sp. nov.**, measurements were made at 200X and 400X magnification; measurements of *C. (Alalinda) dorothea* **sp. nov.** were made at 125X and 250X magnification. Body length is measured from anterior margin of head to apex of metasoma, excluding the exserted part of the ovipositor. The diagnoses for each genus are compared only to other genera within the *Camptoptera* group. Distributions are based mainly on specimens in the CNCI. Unlike most mymarids, sexual dimorphism in forewing shape occurs in *Camptopteroides* (Figs. 1,2). Like all other Mymaridae, sexual dimorphism in antennae is pronounced (Figs. 4, 5)

The number and position of body setae are fairly constant and usually bilaterally symmetrical for a given species or genus. The descriptions in this paper follow the format for setae given in Annecke and Doutt (1961). For example, "1 and 1 setae between posterior ocelli", refers to the single setae on each side of the midline that occurs between the posterior ocelli (e.g., Fig. 3). The abbreviation F stands for funicular segment (females) or flagellar segment (males). Terms used for the male genitalia (Fig. 6) follow Gibson (1997).

Specimens of at least one species of each genus except *Eofoersteria*, where there was insufficient material available, were prepared for scanning electron microscopy (SEM) following Bolte (1996). Microscope slides of wings were photographed with a digital camera. The SEM micrograph negatives were scanned into a computer with a 35 mm scanner. All micrographs and wing images were digitized, enhanced, and the final plates compiled and labelled electronically. In order to facilitate comparison among genera the SEMs and photographs are organized by structure, as follows: head (Figs. 7–42), mesosoma (Figs. 43–78), metasoma (Figs. 79–106), wings (Figs. 107–116), and antennae (Figs. 117–127).

The *Camptoptera* group of genera

As constituted here, the *Camptoptera* group is most closely related to the *Alaptus* group of genera, which includes *Alaptus*, *Dicopomorpha*, *Dicopus*, *Kubja*, *Mimalaptus* and perhaps others. Before listing the combination of features that define the *Camptoptera* group we list the principal distinguishing features of the *Alaptus* group:

1.   very broad junction of mesosoma to metasoma with little indication of a narrowing between mesosoma and metasoma.
2.   mesophragma projecting far into the metasoma.
3.   lack of a vertical median groove above the foramen magnum (except *Dicopus*).

4.   scutellum short and distinctly divided by a transverse groove into anterior and posterior portions of about equal length.
5.   first gastral tergum similar in length and shape (along posterior margin) to the remaining terga.

The combination of 10 features that defines the *Camptoptera* group is listed below. No single feature can be used that unequivocally includes all members of the group and excludes all members outside the group. Thus, within the group there is at least one genus that lacks a particular feature and outside the group there is at least one genus that has that particular feature. Nevertheless, the *Camptoptera* group can be defined reasonably well as follows: Occiput sharply margined at vertex, and with either a vertical median groove or a transverse groove or both above foramen; scutellum entire, not divided by transverse suture; petiole usually distinct, narrow but at most only slightly longer than broad. *Camptoptera*-group species are relatively gracile compared to the short, stocky members of the related *Alaptus* group of genera. With experience and practice, members of the group can usually be recognized by their habitus.

1.   Occiput divided by either vertical or horizontal grooves, or both, above the foramen. A median, vertical groove occurs above the foramen (Figs. 17, 23, 35, 41), in all the genera except some *Camptopteroides* (Fig. 11) and *Stephanocampta* (Fig. 29). A transverse, curved or angled groove or thickening that is complete or incomplete just above foramen (Figs. 11, 17, 29, 35, 41), occurs in all the genera except *Macrocamptoptera* (Fig. 23). *Dicopus* has a vertical groove.
2.   Junction between vertex and occiput sharply defined (Figs. 11, 17, 23, 29, 35, 41), with the occiput flat or slightly concave (Figs. 8, 14, 20, 26, 32, 38).
3.   Mandibles with either 1 tooth in *Camptoptera* (Fig. 36), *Eofoersteria*, and *Stephanocampta* (Fig. 30) or 2 teeth in *Camptopteroides* (Figs. 12, 18), *Macrocamptoptera* (Fig. 24), and *Callodicopus* (Fig. 42).
4.   Female either with 6 funicular segments [in *Eofoersteria* (Fig. 127), some *Camptoptera* (Fig. 124) and some *Camptopteroides* (Fig. 119)] or 7 funicular segments. In species with 7 funicular segments, F2 is usually wider than long, i.e., ring-like (Figs. 4, 117, 118, 120, 121, 123, 126), except in a few *Camptoptera*, some *Stephanocampta* (Fig. 122), and *Callodicopus* (Fig. 125) where it is longer than wide.
5.   Male with 10 flagellomeres [only 7 in the two species formerly placed in C. (*Zemicamptoptera*)], of which F2 (Fig. 5) and sometimes also F4 are ring-like. Males of *Eofoersteria* and species formerly placed in *Sphegilla* are unknown but when found it is expected that they will have at most only 9 flagellomeres.
6.   Anterior portion of scutellum separated from distinctly longer posterior portion by a transverse row of fovea, curved in *Camptopteroides* (Figs. 43, 49) and straight in *Macrocamptoptera* (Fig. 55) or a fine incomplete line in *Stephanocampta* (Fig. 61) or without a separation in *Camptoptera* (Fig. 67), *Callodicopus* (Fig. 73), and *Eofoersteria*.
7.   Forewing of macropterous forms narrow, with the longest fringe setae much longer than greatest wing width (Figs. 1, 3, 107, 109–113), and often with posterior margin towards the apex distinctly concave so the wing appears curved apically (posterior margin straight or almost so in macropterous *Camptopteroides*, Figs. 107, 109). In brachypterous *Camptopteroides* (Fig. 108) the marginal fringe is greatly reduced and the wing appears to be relatively wider.
8.   Gaster usually strongly constricted basally and with a narrow petiole not more than about twice as long as wide (Figs. 91–105), and with mesophragma not projecting into gaster, except

in *Callodicopus*, which has the mesophragma projecting through the broad, ring-like and indistinct petiole into the gaster (Fig. 106).

9.   First gastral tergum often distinctly longer than following terga and with its posterior margin cleft, serrate or undulate.

10.   Ovipositor short and originating beyond middle of gaster (Figs. 80, 84, 86–90), except in *Camptopteroides* (*Alalinda*) where it is longer than half gaster length (Fig. 82).

The genera *Callodicopus*, in the *Camptoptera* group, and *Mimalaptus* Noyes & Valentine, in the *Alaptus* group, appear superficially to be annectant between the two groups of genera. *Callodicopus* species have the structure of the head, scutellum, and first gastral tergum typical of other *Camptoptera*-group genera but have the relatively broad junction between mesosoma and metasoma with a very reduced, indistinguishable petiole similar to *Alaptus*-group genera. On the balance of features, *Callodicopus* is best placed in the *Camptoptera* group. *Mimalaptus* species also appear to share features between the two groups, in particular the curved forewing. However, most features clearly show that *Mimalaptus* belongs in the *Alaptus* group. *Mimalaptus* species have little indication of a constriction between mesosoma and metasoma and they have the apomorphic scutellar structure similar to *Alaptus*. Thus we concur with Noyes and Valentine's (1989) placement of *Mimalaptus* near *Alaptus* and *Dicopus*.

The remaining five genera of the *Camptoptera* group can be divided into two subgroups based on the presence of either 1 or 2 mandibular teeth, and the other features mentioned in key couplet 2. *Macrocamptoptera* and *Camptopteroides* form one subgroup, and *Camptoptera*, *Stephanocampta*, and *Eofoersteria* form the other.

Key to *Camptoptera*-group genera

1   Propodeal foramen large, laterally almost touching each metacoxal foramen (Fig. 106); metasoma apparently without petiole and mesophragma projecting into gaster (Fig. 106) ....
      .... *Callodicopus* Ogloblin

–   Propodeal foramen small, well separated from each metacoxal foramen; metasoma with distinct but sometimes very short gastral petiole (Figs. 91–105) and the mesophragma not projecting past posterior margin of propodeum 2

2(1) Mandibles with 2 teeth (Figs. 12, 18, 24); forewing beyond venation usually with more or less distinct dark areas (Figs. 107–110); head and propodeum with heavy, reticulate sculpture (Figs. 2, 7–24, 43–60); procoxae widely separated anteriorly by broad anterior apex of prosternum (Figs. 45–47, 51–53, 57–59); scutellum with curved, transverse row of fovea separating anterior from posterior portions (Figs. 43, 49, 55) 3

–   Mandibles with 1 tooth (Figs. 30, 36); forewing beyond venation at most with only faint, uniform, darker suffusion (Figs. 111–113, 114); head and mesosoma with inconspicuous sculpture (Figs. 25–36, 61–72); procoxae almost abutting or slightly overlapping anteriorly, the anterior apex of prosternum pointed (Figs. 63–65, 69–71); scutellum without row of fovea separating anterior from posterior portions (Figs. 61, 67) 4

3(2) Forewing with long, distinct macrochaetae, especially the distal macrochaeta (Figs. 107–109); head with moderately long setae on face and vertex (Figs. 2, 7–17); occiput with at least a short, curved or angled, transverse groove above foramen (Figs. 11, 17); prosternum anteriorly with parallel lateral margins (Figs. 45, 46, 51, 52) .... *Camptopteroides* Viggiani

–   Forewing with very short, inconspicuous macrochaetae (Fig. 110); head with very short, in-distinct setae (Fig. 19–24); occiput without horizontal groove above foramen (Fig. 23); prosternum anteriorly with diverging lateral margins (Fig. 57) ... *Macrocamptoptera* Girault

4(2) Tarsi 4-segmented, the apical segment about twice as long as penultimate segment ....
.... *Eofoersteria* Mathot
–   Tarsi 5-segmented, with apical segment about as long as penultimate segment 5

5(4) Propodeum with translucent, mesh-like lamellae (Figs. 61–64, 66); forewing relatively broad, with numerous, scattered microtrichia (Fig. 114) .... *Stephanocampta* Mathot
–   Propodeum without such lamellae (Figs. 67–70, 72); forewing relatively narrow, with few microtrichia in one or two rows (Figs. 112, 113) .... *Camptoptera*

Callodicopus Ogloblin
(Figs. 37–42, 73–78, 89, 90, 106, 115, 116, 125, 126)

Callodicopus Ogloblin 1955: 377; Yoshimoto 1990: 26. Type species: *C. crassula* Ogloblin, by original designation.
Decamymar Annecke 1961: 68. **Syn. nov.** Type species: *D. magniclavae* Annecke, by original designation.

Diagnosis. Body length ca. 0.36–0.9 mm. Occiput with a median vertical groove extending from foramen to vertex and either a distinct, angled, tranverse groove or sclerotized bar extending just above the foramen laterally to either a posterior extension of supraorbital trabcula or to a curved lateral groove originating from posterior apex of supraorbital trabecula (Fig. 41). Mandible 2-toothed (Fig. 42). Female funicle 7-segmented with F2 either ring-like (Fig. 126) or not (Fig. 125). Male flagellum 10-segmented with F2 ring-like. Forewing with posterior margin straight, the wing widening gradually towards apex (Figs. 114, 115, and Yoshimoto 1990, fig. 65). Proximal and distal macrochaeta present and moderately long (Figs. 115, 116). Procoxae widely separated by the broad anterior apex of prosternum. Prosternum anteriorly broad and truncate. Tarsi 5-segmented. Scutellum without transverse row of fovea. Mesophragma extending into gaster (Fig. 106). Propodeum only about one-quarter as long as scutellum (Fig. 78). Propodeal foramen broad, almost touching metacoxal foramen (Fig. 106). Petiole apparently absent.

Ogloblin (1955) described three other genera in addition to *Callodicopus* and suggested that all of them, together with *Dicopus*, could be considered to form their own tribe. *Dicopus* and Ogloblin's *Dicopomorpha* (with its synonyms *Dicopulus* and *Chromodicopus*) indeed appear to be fairly closely related and belong to the *Alaptus* group of genera. We exclude *Callodicopus* species because they have an occiput and scutellum similar to those of other *Camptoptera* group genera. We consider this to be more important in showing the true affinities of *Callodicopus* than the relatively broad attachment of the gaster to the propodeum, lack of distinct narrow petiole, and projection of the mesophragma into the gaster. Consequently, we place *Callodicopus* in the *Camptoptera* group.

We synonymize *Decamymar*, with one described species from Africa, under *Callodicopus* after examination of the two paratypes of *D. magniclavae* (SANC). Most of the described features are the same as for *Callodicopus*, but the transverse thickening above the occipital foramen that occurs in South American species is replaced by a line or groove.

Biology. Unknown.
Distribution. USA (Florida), Central and South America, southern Africa.

Key. Ogloblin (1955) for Argentina.

Included species. *C. crassula*, *C. longicornis* Ogloblin, *C. silvestrana* Ogloblin, *C. cursor* Ogloblin, *C. magniclavae*, **comb. n.**

Camptoptera Förster
(Figs. 31–36, 67–72, 87–88, 103–105, 112, 113, 123, 124)

Camptoptera Förster, 1856: 116, 119, 144; Girault 1909: 22; Annecke and Doutt 1961: 15; Soyka 1961: 73; Schauff 1984: 39; Noyes and Valentine 1989: 29; Yoshimoto 1990: 32. Type species: *C. papaveris* Förster, by monotypy.

Camptoptera (*Zemicamptoptera*) Ogloblin and Annecke, 1961: 24. Type species: *C.* (*Z.*) *semialbata* Ogloblin & Annecke, by original designation.

Congolia Ghesquière, 1942: 320. Type species: *C. sycophila* (Ghesquière), by original designation. Synonymy by Debauche (1949).

Eomymar Perkins, 1912: 26; Annecke and Doutt 1961: 16. **Syn. nov.** Type species: *E. muiri* Perkins, by monotypy.

Pteroclisis Förster, 1856: 144, unnecessary replacement name for *Camptoptera*. Two reasons why this name is unnecessary are that zoological and botanical names are independent of one another and there is at least a single letter difference in the names *Camptopteris* (a fossil plant) and *Camptoptera*.

Sphegilla Debauche, 1948: 62. Type species: *S. franciscae* Debauche, by original designation. Synonymy by Yoshimoto (1990).

Staneria Mathot, 1966: 214. **Syn. nov.** Type species: *S. diademata* Mathot, by original designation.

Stichothrix Förster, 1856: 117, 118, 121; Soyka 1953: 57. Type species: *S. cardui* Förster, by monotypy. Synonymy by Annecke and Doutt (1961).

Wertanekiella Soyka, 1961: 87. Type species: *W. brevicornis* Soyka. Synonymy under *Sphegilla* by Mathot (1969).

Diagnosis. Body length ca. 0.2–0.9 mm. Occiput with a median vertical groove extending from foramen to vertex and a distinct, curved, tranverse groove extending from eye to eye just above the foramen (Fig. 35). Mandible 1-toothed (Fig. 36). Female funicle 7-segmented, with F2 usually ring-like (Fig. 123) but sometimes only 6-segmented (species previously in *Sphegilla*, Fig. 124). Male flagellum 10-segmented with F2 and often F4 ring-like. Forewing with posterior margin almost always concave, giving the wing a distinctly curved apex (Figs. 112–113). Proximal macrochaeta absent and distal macrochaeta often relatively short and fine. Procoxae anteriorly abutting or slightly overlapping. Prosternum anteriorly narrow and pointed or curved. Tarsi 5-segmented. Scutellum without transverse row of fovea. Mesophragma not extending into gaster. Propodeum at least half as long as scutellum. Petiole as long as wide (Figs. 103–105), sometimes with a membranous collar encircling the petiole medially.

Eight genera and subgenera are treated here as synonyms of *Camptoptera*. We discuss them in more detail below, under three names in particular: a) *Sphegilla*, b) *Eomymar*, and c) *Staneria*.

a) Mathot (1969) synonymized *Wertanekiella* under *Sphegilla* which, in turn, was synonymized under *Camptoptera* by Yoshimoto (1990). Only females of the three described species of *Sphegilla* are known and they were stated to have six funicular segments and no ring segment (Debauche 1948; Taguchi 1971), though Yoshimoto (1990) stated that he had seen a definite annelliform F2 in the holotype of *S. franciscae* Debauche. We could not re-examine the type species of *Sphegilla* but a card-mounted specimen from Poland and two slide-mounted specimens of unidentified species

from Switzerland were seen. The Polish specimen differs from *S. franciscae* by the much longer scape and the Swiss specimens differ by the transverse instead of longitudingal striate sculpture on the mesoscutum, thus resembling *S. japonica* Taguchi. The Swiss specimens are very similar to *S. japonica* Taguchi and almost identical in thoracic sculpture to *Camptoptera* (*Zemicamptoptera*) *africana* Ogloblin & Annecke. All have a 6-segmented funicle with no trace of a ring segment (Fig. 124) and appear to be very similar to the two species of *C.* (*Zemicamptoptera*). Possibly, the elongate F2 may be the result of complete fusion of F2 with F3 but more likely F3 was simply lost entirely. A short but distinct gastral petiole is present in the Swiss specimens (the Polish specimens would require slide mounting to observe this feature). Debauche clearly was wrong in stating that a true abdominal petiole was absent. Species of *C.* (*Zemicamptoptera*) may well correspond to *Sphegilla* in that the reduction of male flagellomeres that Ogloblin and Annecke (1961) used to define their subgenus is paralleled by the loss of the ring segment, used in part to define females of *Sphegilla*.

It is illogical to maintain *Sphegilla* as a separate genus from *Camptoptera* on the basis of absence of a ring segment unless *Zemicamptoptera* is also given generic status. In both cases the species have all the features of a typical *Camptoptera* except for a reduction in the number of flagellomeres in males or funicular segments in females. Therefore, the synonymy of *Sphegilla* under *Camptoptera* proposed by Yoshimoto (1990) is upheld, the two described species of *Sphegilla* are transferred to *Camptoptera* as *C. franciscae* (Debauche), **comb. nov.**, and *C. japonica* (Taguchi) **comb. nov.**, and the single described species of *Wertanekiella* is transferred to *Camptoptera* as *C. brevicornis* (Soyka), **comb. nov.**

b) If we were to recognize *Zemicamptoptera* as a subgenus of *Camptoptera*, following Ogloblin and Annecke (1961), then *Eomymar* must also be treated as such and for essentially the same reason – an apparent change in number of funicular segments, but in females rather than males. We do not give *Eomymar* the status of a species group, let alone a subgenus, because there is really no change in number of flagellar segments in males or funicular segments in females with respect to most other *Camptoptera*. The only difference is that *C. muiri*, and *C. fenestratum* (Girault), both **comb. nov.** from *Eomymar*, have F2 in females similar in length to each of the remaining funicular segments instead of ring-like. A third species, *C. camptopteroides* (Girault), **comb. nov.** from *Eomymar*, has female F2 1.34 times as long as wide but only one-quarter the length of F3. It is thus intermediate between a ring segment as in most *Camptoptera* and a normal segment as in *C. muiri* and *C. fenestratum*. The ring segment can thus be considered as a derived feature that evolved as a progressive reduction in length of F2. The fourth species described in *Eomymar*, *E. maximus* Girault, is here transferred to *Mimalaptus* as *M. maximus* (Girault), **comb. nov.** The type slide of *C. muiri* bears four females and one male under a single coverslip. The intact female nearest the centre of the slide is here designated as lectotype in order to clarify application of the name *muiri* to the taxon.

Incidentally, Annecke and Doutt (1961) stated the ring segment was absent in males of *Eomymar*. Examination of the two species whose males are known (*C. camptopteroides* and *C. muiri*) confirm that the ring segment is indeed present. In addition, each of the following segments is constricted and slightly desclerotized just before the ring-like sclerotized apex. Thus, it appears that there are 7 more ring segments, one at the end of each flagellomere except the apical one.

c) Mathot (1966) stated that *Staneria* is close to *Camptoptera* but differs by the presence of placoid sensilla on the vertex, the position of the hypochaeta, and the form of the wings. His illustrations show a group of 4 placoid sensilla just medial to each lateral ocellus and the hypochaeta on the wing membrane behind the stigmal vein. The holotypes of *C. fenestratum* Girault and *C. camptopteroides* Girault (QMBA, examined) also have placoid sensilla and hypochaetae in the same relative positions, as do the illustrations of *C. scholli* Ogloblin and Annecke (1961). Only

the number of sensilla in each cluster varies, from 4 in *Staneria diademata* to about 14 in *C. camptopteroides*. The number of sensilla also varies from one side to the other of the same specimen, e.g., 6 and 9 in *E. fenestratum*. Ghesquière's (1942) illustration of the forewing base of *Congolia sycophila* Ghesquière resembles those of *Staneria diademata* Mathot and *C. scholli* in that all three species have a seta on the ventral surface of the disc behind the apex of the marginal vein or the stigma. Mathot (1966) called this seta the hypochaeta and used its position as one feature to separate *Staneria* from *Camptoptera*. If the position of this seta is of generic value then *Staneria* is a synonym of *Congolia*, on the basis of this feature at least, and so is *Eomymar*. But *Eomymar* is clearly a synonym of *Camptoptera* and we also concur with Debauche (1949) that *Congolia* is a synonym of *Camptoptera*. Thus, *Staneria* would remain generically distinct only on the presence of a group of placoid sensilla medial to each lateral ocellus. We cannot but agree with Ogloblin and Annecke that species with this feature belong in *Camptoptera*. Thus, we synonymize *Staneria* under *Camptoptera* and transfer its type species to *Camptoptera* as *C. diademata* **comb. nov.**

    Biology. Species of ten families are reported as hosts for *Camptoptera* (including *Eomymar*): Coleoptera – Buprestidae; Homoptera – Aleyrodidae, Cicadellidae, Delphacidae, Kerriidae; Hymenoptera – Braconidae, Cynipidae; Lepidoptera – Tortricidae; Thysanoptera – Thripidae; and Coleoptera – Scolytidae, (Huber 1986, 1997). An additional, unpublished record (specimens received from K. Hoffman, Department of Entomology, Clemson University) is from *Derodontus* (Derodontidae). Most of the host associations require confirmation. The scolytid record is based on three specimens (CNCI) laboratory reared from eggs of *Pityophthorus tuberculatus* Eichhoff collected on *Pinus contorta* on 25.vii.1990, 20 km S. at Swan Hills, Alberta, Canada.

    Distribution. Worldwide.

    Keys. Regional keys to some of the described species are follows: Girault (1909) for North America; Ogloblin (1947) for Argentina; Soyka (1953, 1961) for Europe; Ogloblin and Annecke (1961) for Africa; Viggiani (1978b) and Subba Rao (1989) for India and Sri Lanka.

    Included species. Seventy-four described species (Table I).

    Discussion. *Camptoptera* is by far the most speciose genus of the *Camptoptera* group. Individuals are common and morphologically diverse, as mentioned already by Debauche (1948) and Noyes and Valentine (1989), especially in tropical forests. Because *Camptoptera* contains so many species it would be very useful if the genus could be divided into meaningful species groups. A thorough review of all characters across all species is necessary to determine how this should best be done. One could envisage two species groups, very unequal in number of species in each, that differ in the number of male flagellomeres or female funicular segments, analogous to the situation in *Anaphes* Huber (1992). The *armata* group, currently including most of the species, would be defined by having the normal complement of male and female antennal segments and the *semialbata* group would be defined by the reduction in the number of male flagellomeres from 10 to 7 or female funicular segments from 7 to 6. The latter group would correspond to Ogloblin and Annecke's (1961) *C. (Zemicamptoptera)* and Debauche's (1948) *Sphegilla*. Unfortunately, *Camptoptera (Z.) semialbata* and, according to Yoshimoto (1990), *Sphegilla franciscae* apparently have a ring segment so the groups are not completely distinct. We certainly do not consider it useful to treat either *C. (Zemicamptoptera)* or *Sphegilla* as subgenera. A better method would be to ignore number or relative lengths of antennal segments and define species groups on features such as propodeal structure, which shows considerable variety among the species. For example, many species have minute spicules on the median part of the propodeum and lack sublateral carinae whereas others seem to lack spicules but have strong parallel carinae on the propodeum, e.g., *C. matcheta* Subba Rao. This species, or perhaps a similar one from Borneo (UCDC, examined), also differs from typical *Camptoptera* in having an almost vertical, flat propodeum overhung dorsally

TABLE I. Checklist of *Camptoptera* species. The genus or subgenus in which each species was originally placed is given in parentheses when it differs from the nominate genus.

aequilonga Soyka, 1961: 85
africana Ogloblin & Annecke, 1961: 305 (subgenus *Zemicamptoptera*)
ambrae Viggiani, 1978b: 152
andradae Soyka, 1961: 75
angustipennis Ogloblin, 1947: 504
annulata Soyka, 1961: 76
aula Debauche, 1948: 71
brevicornis (Soyka), 1961: 88 (*Wertanekiella*)
brevifuniculata Subba Rao, 1989: 162
brunnea Dozier, 1933: 97
camptopteroides (Girault), 1916: 208 (*Eomymar*)
cardui (Förster), 1856: 121 (*Stichothrix*)
clavata Provancher, 1888: 404
cloacae Taguchi, 1972: 228
colorata Soyka, 1961: 77
concava Taguchi, 1972: 225
diademata Mathot, 1966: 216 (*Staneria*)
dravida Subba Rao, 1989: 163
dryophantae Kieffer, 1902: 8
ellifranzae zur Strassen, 1950: 145
elongatula Kryger, 1950: 46
fenestrarum (Girault), 1918: 198 (*Eomymar*)
foersteri Girault, 1917: 20
franciscae (Debauche) 1948: 63 (*Sphegilla*)
gregi Girault, 1913: 107
gschnitzi Soyka, 1961: 77
hundsheimensis Soyka, 1961: 78
immensa Girault, 1933: 5
intermedia Soyka, 1961: 75
interposita Soyka, 1961: 79
japonica (Taguchi), 1971: 52 (*Sphegilla*)
kannada Subba Rao 1989: 163
kressbachi Soyka, 1961: 80
lapponica Hedqvist, 1954: 275
longifuniculata Viggiani, 1978b: 153
loretoensis Ogloblin, 1947: 495
magna Soyka, 1946: 43
matcheta Subba Rao, 1989: 161
minorui Taguchi, 1971: 49
minutissima Dozier, 1932: 89
missionica Ogloblin, 1947: 499
muiri (Perkins 1912) (*Eomymar*)
nigra Soyka, 1961: 81
nigrosimilis Soyka, 1961: 81
okadomei Taguchi, 1972: 224

TABLE I – continued

papaveris Förster, 1856: 119
parva Soyka, 1961: 85
pechlaneri (Soyka), 1953: 58 (*Stichothrix*)
peripilosa Soyka, 1961: 83
perineti Risbec, 1952: 436 (*Stichothrix*)
philippina Taguchi, 1972: 223
pretoriensis Ogloblin & Annecke, 1961: 293
protuberculata Viggiani, 1978b: 155
psocivora Mathot, 1972: 392
pulla Girault, 1909: 27
reticulata Ogloblin, 1947: 501
saintpierrei Girault, 1915: 154 (probably an invalid name for *papaveris* Girault 1909 nec Förster)
sakaii Taguchi, 1977: 143
scholli Ogloblin & Annecke, 1961: 299
semialbata Ogloblin & Annecke, 1961: 302 (subgenus *Zemicamptoptera*)
serenellae Viggiani, 1978b: 151
setipaupera Soyka, 1961: 84
signatipennis Soyka, 1961: 85
stammeri (Soyka), 1953: 5 (*Stichothrix*)
strobilicola Hedqvist, 1956: 37
sycophila (Ghesquière), 1942: 321 (*Congolia*)
taenia Taguchi, 1972: 225
taiwana Taguchi, 1977: 144
tarsalis Kryger, 1950: 47
tenuis Soyka, 1961: 85
tuberculata Viggiani, 1978b: 154
vanharteni Viggiani & Jesu, 1995: 99
vinea Taguchi, 1972: 227
yamagishii Taguchi, 1971: 51

by the posterior apex of the scutellum, in contrast to an often more rounded and sloping propodeum that appears to merge evenly with the scutellum (Fig. 68). Study of body features such as these may yield a better understanding of the species diversity within *Camptoptera* and may even lead to the generic limits being modified again.

Camptopteroides Viggiani
(Figs. 1–18, 43–54, 79–82, 91–96, 107–109, 117–120)

Camptopteroides Viggiani 1974: 3. Type species: *C. armata* Viggiani, by original designation.
Paranagroidea Noyes and Valentine 1989: 44. **Syn. nov.** Type species: *P. verrucosa* Noyes and Valentine, by original designation.

    Diagnosis. Body length ca. 0.6–1.13 mm. Occiput with or without a median vertical groove extending from foramen to vertex and an angled or curved transverse groove extending to or towards eye (Figs. 11, 17). Mandible 2-toothed (Figs. 12, 18). Female funicle usually 7-segmented with F2

ring-like, either slightly shorter (Fig. 4) or slightly longer than wide, but sometimes 6-segmented, with the ring segment absent (one species from Indonesia, Sulawesi, CNCI). Male flagellum 10-segmented with F2 ring-like (Fig. 5). Both sexes either macropterous or micropterous. Gaster sometimes compressed. Forewing in macropterous specimens straight, usually parallel-sided and apically pointed in females (Figs. 1, 107, 108) or uniformly broadening towards apex in males (Fig. 3) and some females, and usually maculate (Fig. 107–109), but often wings more or less reduced (Fig. 108), and the forewing disc with few (females) to several (males) microtrichia, especially at apex. Proximal and distal macrochaetae both present (Figs. 1, 3, 107–109). Procoxae widely separated by the broad anterior apex of prosternum. Prosternum anteriorly broad and truncate (Figs. 47, 53). Scutellum with transverse row of fovea. Tarsi 5-segmented. Mesophragma not extending into gaster. Propodeum about as long as scutellum (Figs. 43, 49, 54). Petiole as long as wide (Figs. 91–96).

Camptopteroides species are most easily recognized by the more or less distinctly patterned forewing, and heavy reticulation and long, thick setae on head and mesosoma. *Camptopteroides* is most similar to *Macrocamptoptera*. Both genera are relatively large and robust with the propodeum distinctly reticulate. The long, distinct macrochaetae of *Camptopteroides* distinguish them from *Macrocamptoptera*, which have short, inconspicuous macrochaetae. An undescribed male from Costa Rica (UCRC) has a wing shape more resembling *Macrocamptoptera* than *Camptopteroides*, though it has the long macrochaetae of the latter. The prosternum is hidden by the head and cannot be examined until the specimen is slide-mounted.

Males tend to be macropterous and in the New World at least no brachypterous males have yet been found. Brachypterous or micropterous females occur much more frequently in the Old World whereas only one micropterous female (Dominican Republic, CNCI) has been found so far in the New World.

Biology. Unknown.

Distribution. *C.* (*Camptopteroides*) – Australian (Australia, Fiji, New Zealand), Oriental (India, Indonesia, China, Vietnam), and Neotropical regions (Dominican Republic); *C.* (*Alalinda*) – Nearctic (USA) and Neotropical (Mexico, Central and South America) regions.

Included species. *C.* (*Camptopteroides*) *alata* Lin, **sp. nov.**, *C.* (*Camptopteroides*) *armata*, *C.* (*Camptopteroides*) *verrucosa*, **comb. nov.**, *C.* (*Alalinda*) *dorothea* Huber, **subgen. and sp. nov.**

Discussion. In their description of *Paranagroidea*, Noyes and Valentine (1989) did not count the anelliform segment of females as a segment, though they did for males and in their generic key. For consistency, it should be counted as one of the segments, when present.

Two subgenera are recognized, one of which is newly described below. Only one apparently constant character distinguishes each subgenus – the nature of the occipital suture. Other features help to distinguish the two but are not constant. These are discussed under *Camptopteroides* (*Alalinda*).

C. (*Alalinda*) was initially thought (by JH) to be a *Macrocamptoptera* or (by C. Yoshimoto) a *Callodicopus* but it is best placed within *Camptopteroides*. *C.* (*Alalinda*) would key to *Camptoptera* (including *Macrocamptoptera*) in Huber (1997) but differs by the patterned forewing with long macrochaetae, the median vertical occipital sulcus, and the parallel sides of the prosternum.

Macropterous females of *C.* (*Camptopteroides*), at least in the old world, have narrower, almost parallel-sided wings (Figs. 1, 107) compared to *C.* (*Alalinda*) (Fig. 109) whereas males of both subgenera usually have wings that widen distinctly and uniformly towards the apex (Fig. 3). *C.* (*Camptopteroides*) species tend to be more heavily sculptured, especially on the head, than *C.* (*Alalinda*) species. The presence of a median vertical suture above the occiput varies; most new world species have it and most old world species don't, but exceptions occur in each region.

C. (*Camptopteroides*) have a straight malar sulcus whereas *C.* (*Alalinda*) have a more or less strongly curved malar sulcus.

Several undescribed species are represented in various collections (ANIC, CNCI, QMBA, BMNH) but only *C. verrucosa* (Noyes and Valentine 1989), **comb. nov.** from *Paranagroidea*, from New Zealand and *C. armata* from Ceylon are described. Two others are described below.

Camptopteroides (*Alalinda*) Huber, new subgenus
(Figs. 13–18, 49–54, 81–82, 94–96, 109, 120)

Type species. *Alalinda dorothea* Huber, new species.

Etymology of subgenus. A combination of Spanish words, "ala" meaning wing, and "linda" meaning pretty, referring to the patterned wings of all members of the subgenus. Gender feminine.

Diagnosis. *Camptopteroides* (*Alalinda*) is distinguished from the nominate subgenus by the sutures of the occiput. In *C.* (*Camptopteroides*) the occipital suture extends from eye to eye, in the form of a very broad and shallow W (Fig. 11) whereas in *C.* (*Alalinda*) it forms a broad upside down V not much wider than the occipital foramen (Fig. 17).

Description. Female. Colour. Head and mesosoma dark brown to black, metasoma usually yellow basally and ventrally with varying amounts of brown towards apex dorsally. Scape, pedicel and legs usually yellowish, varying to light brown, often with darker tibiae; flagellum dark brown. Wings with dark patterns and a pale spot subapically.

Head. Head (Figs. 13–17) about 1.8 times wider and 1.6 times higher than long, and in dorsal view broadly hemisperical with slightly concave posterior surface (Fig. 13). Face in anterior view distinctly narrowing between eyes, bordered laterally by curved frontal suture that curves laterally below eye then inward ventrally to lateral margin of mouth (Figs. 15, 16), and face in lateral view flat above and below toruli but abruptly receding just above mouth opening (Fig. 14). Toruli a little less than their own diameter from transverse trabecula (Fig. 15). Eye well developed, in lateral view, extending posteriorly almost to occiput dorsally but far from occiput ventrally so gena appearing triangular posteroventral to eye (Fig. 14). Malar space about half eye length and without malar sulcus (Fig. 14). Vertex in lateral view smoothly and evenly curved to face (Fig. 14), in dorsal view sharply margined at occiput (Figs. 14, 17). Ocelli low triangle with following approximate proportions: POL = 2.1, OOL = 0.6, LOL = 1.1, with posterior ocelli almost touching occiput (Fig. 13). Occiput dorsally with a fine median groove extending from sharp dorsal margin to just above foramen where it joins two lateral arms extending ventrolateral towards lower apex of eye, the grooves forming a distinct upside down Y (Fig. 17). Maxilla slender, about 3 times as long as wide and 3 times as long as triangular labium (Fig. 17). Setation of head as follows, with the setae along dorsal margin of eye and between posterior ocelli the largest: 2 and 2 on occiput above foramen; 1 and 1 between posterior ocelli; 2 anterolateral to anterior ocellus; 4 in two groups of 2 along eye margin, the anterior 2 lateral to upper face and the posterior 2 lateral to posterior ocelli; about 5 and 5 on face below toruli (3 laterally and 2 submedially); 2 and 2 between toruli; and 2 and 2 on malar space lateral to mouth margin.

Antenna. Radicle distinct, about one-third as long as rest of scape. Funicle 7-segmented, with F2 minute, ring-like and somewhat triangular so funicle often bent at that point, the antenna thus appearing double geniculate. Clava 1-segmented.

Mouthparts. Labrum with 1 seta. Mandible with 2 teeth (Fig. 18).

Mesosoma. About 1.4 times as long as high and 1.2 times as long as wide; uniformly curved dorsally in lateral view and entirely covered with reticulate sculpture (Figs. 49–54). Pronotum (Figs. 50, 53) short, entire, not visible in dorsal view, with straight posterior margin medially and narrow lateral panels. Propleura (Figs. 51–53) flat and fitting tightly against ventral margins of

pronotum and lateral margins of prosternum. Prosternum (Figs. 51, 52) narrowly rectangular anteriorly, widening posterioly just in front of coxae and apparently with a fine median longitudinal line at least posteriorly. Mesothoracic spiracle small, oval, at posterodorsal angle of pronotum. Mesoscutum relatively short and strongly curved in lateral view (Fig. 50). Notauli narrow, almost parallel. Scutellum slightly wider than long, with gently curved anterior and posterior margins and a transverse curved row of fovea in anterior third separating anterior from posterior scutellum (Figs. 49, 54). Axilla (Figs. 50, 54) small, transversely rectangular, divided into two sections by median longitudinal line, and only very slightly advanced into mesoscutum. Mesopleuron (Fig. 50) long and narrow, almost horizontal, longitudinally divided by a narrow groove anteriorly and a thicker line of fovea posteriorly, and ventrally merging smoothly with mesosternum. Metanotum apparently absent, visible only as very narrow line of different sculpture at anterior margin of propodeum (Figs. 49, 54). Propodeum almost as long as scutellum and in lateral view apparently smoothly merging with it (Figs. 50, 54). Propodeal spiracle minute; propodeal seta about halfway between spiracle and propodeal-metacoxal junction (Fig. 54). Setation of mesosoma as follows: pronotum with 1 and 1 setae submedially and 1 and 1 near posterolateral corners; mesoscutum with 1 and 1 strong sublateral setae in anterior half of midlobe and 1 and 1 near lateral angle of lateral lobe; axilla with 1 strong seta at anteromedian corner; scutellum with placoid sensilla widely separated, closer to axillar seta than to each other; propodeum with 1 and 1 propodeal seta about midway between posterior margin and spiracles.

Wings. Forewing (Fig. 109) narrow, widening uniformly towards apex, with posterior margin beyond venation almost straight and anterior margin towards apex strongly curved so apex distinctly asymmetrical. Colour pattern distinctive: membrane beyond venation with two dark areas separated by a clear area towards the apex. Marginal fringe with longest cilia distinctly longer than greatest wing width. Venation extending just over one-third wing length. Both macrochaetae and hypochaeta well developed and clearly visible, the distal macrochaeta about 3 times as long as proximal macrochaeta and the hypochaeta close to proximal macrochaeta.

Hindwing narrow and parallel-sided, with faint, uniform, brown suffusion broken by numerous, fine, clear transverse lines.

Legs. Coxa, especially hind coxae, distinctly reticulate. Tarsi 5-segmented, with first segment about 3 times as long as second. Foretibia with numerous short, thick spines. Foretibial spur bifurcate, with inner tine shorter than outer tine and their junction about halfway along spur length.

Metasoma. Gastral petiole (Figs. 94–96) narrow and distinct, slightly longer ventrally than dorsally, but shorter than wide or high. Gaster (Figs. 81, 82) with Gt_2 the longest tergum, Gt_3 slightly shorter, Gt_4–Gt_7 subequal in length and much shorter than Gt_7, Gt_8 laterally about twice as long as medially. Gt_8 with spiracle. Ovipositor arising in apical half of gaster and at most slightly exserted. Sterna broadly covered by terga; St_2 about as long as Gt_2, and anteriorly with reticulate sculpture; remaining sterna not clearly visible but probably equal in length to corresponding terga; St_6 (hypopygium) distinct, extending posteriorly to slightly beyond apex of gaster. Cercal plate with 3 long curved setae. Most terga with 1 and 1 long seta submedially and 1 and 1 shorter seta sublaterally, but Gt_3 with only 1 and 1 seta, Gt_8 with 2 and 2 lateral setae behind spiracle, and Gt_9 with 3 setae.

Male. Similar to female but metasoma usually entirely dark brown (except type species). Antenna with 10 flagellomeres, including a ring-like F2; radicle shorter than in female and not so distinct, about one-quarter total length of scape. Genitalia very similar to those of *C.* (*Camptopteroides*) (Viggiani 1989, and Fig. 6) but we consider that they are of his "type 2" rather than "type 3", in that aedeagal apodemes and digiti (with 3 teeth) are present and there is at least a partial sac-like encapsulation around the genitalia.

Distribution. Western Hemisphere, from USA (South Carolina, Missouri) south to Argentina. Several undescribed species occur in Central and South America. They differ in wing width, extend of brown maculation on the forewing and body sculpture. They are rarely collected and most are represented, in the CNCI at least, by only one or a few specimens, mainly females.

Camptopteroides (*Alalinda*) *dorothea* Huber, new species
(Fig. 109)

Type material. Holotype ♀ (CNCI), cleared and dissected, under 4 coverslips in Canada balsam on slide labelled as follows: 1. "*Camptopteroides* (*Alalinda*) *dorothea* Huber HOLOTYPE ♀ dorsal". 2. "SC: Anderson Co., Pendleton 25022m 17–27.vi,1987; FIT Mat. Hardwood Forest CNC Hym. Team".

PARATYPES. 6 ♀♀ and 1 ♂. USA: **Florida**: Alachua Co., Gainesville, AEI, iv–14.vii.1987, CNC Hym. Team (2 ♀♀ on points, CNC, USNM). **Missouri**: Wayne Co., Williamsville, 1–19.vi.1988, J.T. Becker (1 ♀ on point CNCI). **South Carolina**: Anderson Co., Pendleton, 250m, 13–18.v.1987, hardwood forest, CNC Hym. Team (1 ♀ on point); Dorchester Co. Francis Beidler forest, 10km NE Harleyville, 11–23.v.1987 and 26.v–11.vi; FIT, MT, bald cypress swamp (1 ♀ on point, 1 ♀ & 1 ♂ on slides, CNCI).

Biology. Hosts are unknown. Specimens were collected in Malaise or flight intercept traps in forests of various types.

Description. Female. Colour. Head and mesosoma dark brown, sometimes with faint green metallic reflections on head in certain lights. Radicle yellow, scape and pedicel yellowish except dorsal and ventral margins of scape and pedicel basally, brown. Funicular segments and clava dark brown. Coxae and trochanters dark brown (except sometimes middle coxa posteriorly or apically whitish), trochantelli whitish, femora of fore- and middle legs brown, sometimes with lighter areas, hind femur yellowish, tibiae and tarsi of all legs lighter brown than femora. Forewing (Fig. 109) with clear spot near apex poorly defined and merging indistinctly with surrounding brown areas.

Head. Head width (holotype) 296 μm. Vertex with isodiametric mesh-like sculpture except anteriorly along trabecula where sculpture is transverse.

Antenna. Measurements in m (n=2, holotype and one paratype). Mean (range in parentheses where needed) of length of each segment: radicle + scape 255 (252–258), pedicel 69 (65–72), F1 58, F2 15 (14–15), F3 69 (67–71), F4 55 (52–57), F6 53, F7 56, clava 275 (271–279). Length/width of funicular segments varies from 3.37 (F2) to 1.78 (F7). The clava has 4 longitudinal sensilla but the funicular segments lack these.

Mesosoma. Mesoscutum with fine, indistinct, somewhat transverse reticulate sculpture. Scutellum with indistinct, somewhat longitudinal scuplture medially, the sculpture becoming distinct laterally and on axilla. Metanotum medially and propodeum distinctly, deeply reticulate.

Metasoma. As described for genus.

Male. Colour as in female, but with a little more brown on gaster. Antennal measurements (n=1) as follows: radicle + scape 136, pedicel 55, F1–10 119, 7, 129, 132, 129, 121, 125, 122, 117, 116.

Etymology. The species is named in honour of my late mother, Dorothy Huber.

Camptopteroides (*Camptopteroides*) *alata* Lin, sp. nov.
(Figs. 1 – 6)

Type material. Holotype ♀ (Fujian Agricultural University, Fuzhou, China) on slide, from Tongmu, Wuyishan Nature Reserve, Fujian, China, July 25, 1985, Lin Naiquan, collected by sweeping. Allotype ♂, with same collection data as holotype.

Diagnosis. The female of *C. alata* differs from *C. verrucosa* by an almost globular F4–F7 (F4–F7 distinctly longer than wide in *C. verrucosa*), a relatively longer ovipositor that is about 0.83X the length of the middle tibia (about 0.72X in *C. verrucosa*), and an eye that is longer than the malar space (shorter in *C. verrucosa*). The male of *C. alata* has a long, slender, pointed aedeagus (shorter, broader and bluntly rounded in *C. verrucosa*), more similar to the aedeagus of *C. armata*, which is somewhat intermediate between the two species. *C. armata* has only two spines on the digiti (Viggiani 1974, 1989), compared to three spines in *C. alata* and *C. verrucosa*. The female of *C. armata* is still unknown.

Description. Female. Body length 0.98 mm. Body dark brown to black; base of scape, F1, femora, tibiae, and tarsi pale yellow to testaceous; mandibles and wing venation, except for middle section of hind wing vein, dark brown. Eye dark reddish. Wings semihyaline, with yellow-brown suffusion, especially immediately behind venation and along wing margins.

Head (Fig. 3) in anterior view wider that long (78:60), with strong reticulate sculpture. Eye longer than malar space (30:22). POL about 15, equal to OOL.

Antenna (Fig. 4) with relative lengths of scape, pedicel, F1–F7, and clava as follows: 64:20:13:1:1.5:9:8:8:10:75. Scape about 4.3X as long as wide (64:15). F1 the longest funicular segment, almost twice as long as wide (13:7); F2 anelliform, about one-quarter as long as wide; F3–7 subequal in length, only F3 a little longer than wide (9:6.5); F4–F7 each about as long as wide. Each funicular segment, except F2, with flagellar setae arranged more or less in two whorls. Clava 2.6X as long as wide (75:29) and about 1.3X length of funicle (75:58), with 4 sensory ridges on dorsolateral surface.

Mesosoma longer than metasoma (110:85), with distinct reticulate sculpture, the reticulations almost the same size as on head. Axilla with long axillary seta almost at anteromedian angle. Propodeum about as long as mesoscutum (82:80).

Forewing (Fig. 1) about 8X as long as wide (178:22), parallel-sided, and with a few microtrichia on disc near apex and the longest fringe cilia (on anterior margin) about 4X as long as width of blade. Hind wing about 10X as long as wide (180:18), with a few microtrichia on disc near apex and the marginal cilia about 6X as long as blade width.

Fore- and hind leg with coxae distinctly reticulate and middle leg with coxa faintly reticulate. Proportions of femur:tibia:tarsi as follows: foreleg 58:49:62, middle leg 63:76:54, hind leg 75:80:63.

Metasoma shorter than mesosoma (85:110), without distinct sculpture. Gaster laterally compressed, with second tergum covering almost nine-tenths of gaster. Ovipositor about three-quarters length of metasoma (63:85) and four-fifths length of middle tibia (63:76), not exserted beyond gastral apex.

Male. Similar to female except as follows. Body length 1.14 mm. Antenna (Fig. 5) about 1.5X as long as body (463:250), with relative lengths of scape, pedicel, and F1–10 as follows: 43:14:44:2:46:46:47:44:45:44:44:43. Each flagellar segment except F2 more than 6X as long as wide and with 4 sensory ridges. F2 ring-like, wider than long. Fore- and hind wings (Fig. 2) increasing in width towards apex, with many more microtrichia on disc than in female. Genital capsule (Fig. 6) 0.22X as long as middle tibia (39:178). Aedeagal apodemes curved ventrally and 0.18X as long as middle tibia. Digiti each with three teeth.

Etymology. The specific epithet, *alata*, refers to the fully winged male of the species (as in *C. armata* but in contrast to *C. verrucosa*).

Eofoersteria Mathot
(Figs. 111, 127)

Eofoersteria Mathot 1966: 231. Type species, *E. camptopteroides* Mathot, by original designation.

Diagnosis. Body length ca. 0.25–0.32 mm. Occiput with a median vertical groove extending from foramen to vertex and curved transverse groove extending to lateral margin of head below eye. Mandible 1-toothed, sharply pointed. Female funicle 6-segmented, without a ring-like segment (Fig. 127). Procoxae anteriorly abutting. Prosternum anteriorly pointed. Scutellum without transverse row of fovea. Forewing slightly but distinctly curved (Fig. 111). Proximal macrochaetae absent, distal macrochaeta short. Tarsi 4-segmented. Propodeum at least half as long as scutellum. Petiole as long as wide.

The two main features that distinguish *Eofoersteria* from the other genera in the group are either a loss (funicle 6-segmented) or a fusion (4-segmented tarsi). On this basis *Eofoesteria* can be treated as a derived offshoot of *Camptoptera*.

Biology. Unknown.

Distribution. Afrotropical (Congo), Oriental (Ceylon), Australian (Australia), Nearctic (southern Florida), and Neotropical regions (Trinidad).

Key. Viggiani (1978a).

Included species. *E. camptopteroides*, *E. secunda* Viggiani, *E. vasta* (Girault), **comb. nov.** from *Camptoptera*.

Discussion. *Eofoersteria vasta* (Girault) is the third species to be added to the genus. Although Girault (1920) did not specify how many specimens he examined when describing this species it is certain that there is only one, so we follow Dahms (1986) in treating the only known specimen as the holotype. This specimen is on a slide with eight other specimens (under three coverslips) representing four other species of Hymenoptera. Dahms (1984: 662 and 1986: 628) confused the various species in his description of the position of the specimens on the type slide. Their positions are clarified as follows. The holotype female of *E. vasta* is the uppermost specimen on the coverslip partially filled with Canada balsam and nearest Girault's label. It is mounted ventral side up. The specimen immediately below this is a female *C. gregi* Girault. It is mounted dorsal side up and, as pointed out by Dahms (1984), it may or may not be one of the nine specimens of this species mentioned by Girault (1915). The remaining four specimens (3 ♀♀ and 1 ♂) under the same coverslip represent an unidentified *Alaptus* species. The middle coverslip fragment contains the holotype female of *Erythmelus pauciciliatus* Girault. The coverslip fragment furthest from Girault's label contains two unidentified Trichogrammatidae.

We report here a fourth species of *Eofoersteria* based on four females from Trinidad and southern Florida, thus extending the range of this genus into the New World. This species is not formally described at this time because of lack of sufficient material for proper study. It is the smallest species of the genus, measuring about 250 μm.

Because there are at least two reductions involving different parts of the body we maintain *Eofoersteria* as a distinct genus. Had there been only one reduction, e.g., in the number of funicular segments, we would probably have synonymized the genus under *Camptoptera* and treated it at most as a species group.

Mathot (1966) pointed out that the 4-segmented tarsi of *Eofoersteria* casts doubt on the subdivision of Mymaridae into subfamilies and tribes on the basis of tarsomere number. He also

stated that it wasn't much more satisfactory to base higher classification of Mymaridae on abdominal characters, as proposed by Annecke and Doutt (1961). While we agree with Mathot's first statement, we are not sure about his second, though evidence in the *Camptoptera* group suggests that the picture is more complex that previous classifications would suggest. The nature of the junction between mesosoma and metasoma is more complex than simply apparent loss or fusion of the petiole. The problem with this character complex is that there are intergrades, as shown by *Callodicopus*.

Reduction in tarsomere number from 5 to 4 has likely occurred several times in Mymaridae. In *Eofoersteria*, the apical tarsomere is at least twice as long as each of the remaining tarsomeres. Its length and the fact that it has about twice the number of setae as any of the previous segments means that it is a fusion of segments 4 and 5. The 6-segmented female funicle with no trace of a ring segment represents a complete loss of F2, similar to that found in at least one *Camptopteroides* (Fig. 119). Clearly, loss or perhaps fusion of segments, whether antennal or tarsal, occurs much more frequently than previously realized, necessitating a re-evaluation of generic limits in several groups. Unfortunately, in the past, too much reliance was placed on the number and constancy of appendage segments for defining genera, with the result that several genera, not only in the *Camptoptera* group, are too narrowly defined.

Macrocamptoptera Girault, revised status
(Figs. 19–24, 55–60, 83, 84, 97–99, 110, 121)

Macrocamptoptera Girault, 1910: 239. Type species: *Camptoptera metotarsa* Girault (1905), by original designation.
Herulia Hedqvist, 1962: 103. **Syn. nov.** Type species: *H. sundholmi* Hedqvist, by original designation.
Rhila Donev, 1989: 79. **Syn. nov.** Type species: *R. bulgarica* Donev, by original designation.
Camptoptera (*Macrocamptoptera*); Yoshimoto 1990: 34.

Diagnosis. Body length ca. 0.9–1.5 mm. Occiput with a median vertical groove extending from foramen to vertex but without a transverse groove extending to posterior extension of supraorbital trabecula (Fig. 23). Mandible 2-toothed (Fig. 24). Female funicle 7-segmented (Fig. 121). Male flagellum 10-segmented with F2 ring-like. Forewing relatively broad, and widening distinctly towards apex (Fig. 110). Proximal and distal macrochaetae present but short and indistinct (Fig. 110). Prosternum anteriorly broad and truncate (Fig. 57–59). Procoxae widely separated by the broad anterior apex of prosternum. Scutellum with transverse row of fovea (Fig. 55). Propodeum about as long as scutellum (Figs. 55, 60). Tarsi 5-segmented. Petiole longer than wide (Figs. 97–99).

Macrocamptoptera differs from *Camptopteroides*, the genus to which it is probably most closely related, by the relatively short and inconspicuous macrochetae and slightly incurved posterior margin of the forewing, the lack of a transverse groove on the occiput above the foramen (Fig. 23), and the shape of the prosternum (Fig. 57). Otherwise, its species are similar in general appearance to species of *Camptopteroides* (*Alalinda*).

Biology. Unknown. Although not common, *Macrocamptoptera* is fairly widespread and has mostly been collected in deciduous forests. In North America one series has been collected from yellow pan traps set on or around wood piles. The species may parasitize eggs of insects boring in wood.

Distribution. North America, Europe.

Included species. *M. metotarsa*, *M. sundholmi*, **comb. nov.** from *Herulia*, *M. bulgarica*, **comb. nov.** from *Herulia*.

Macrocamptoptera metotarsa occurs throughout eastern North America (CANADA: Ontario, Quebec. USA: Arkansas, Georgia, North Carolina, South Carolina, Florida, Tennessee) and as far west as Alberta, New Mexico and California (all specimens in CNCI). The forewing color pattern of *M. metotarsa* varies in the amount of infuscation (compare fig. 64 in Yoshimoto 1990 with Fig. 110 here). This may be due either to regional variation or simply whether specimens are fresh or faded. *Macrocamptoptera sundholmi* (Hedqvist) occurs in Sweden and Belgium (two specimens in CNCI) and *M. bulgarica* (Donev) is known only from the holotype from Bulgaria. The latter name may eventually prove to be a synonym of *M. sundholmi*. Soyka (1961) described *M. grangeri* from a single female from France. Viggiani and Jesu (1988) included it in *Camptoptera* but until we can examine the holotype we are uncertain whether it is a very small *Macrocamptoptera* or a large *Camptoptera*. It is not included in the list of *Camptoptera* species.

Discussion. Peck (1951) placed *Macrocamptoptera* under *Camptoptera* and this synonymy was accepted by Annecke and Doutt (1961) and Schauff (1984). Soyka (1961) and Noyes and Valentine (1989: 45) treated *Macrocamptoptera* as separate from *Camptoptera*. Yoshimoto (1990) treated it as a subgenus under *Camptoptera*. We re-affirm *Macrocamptoptera* as a genus separate from *Camptoptera*.

Taguchi (1971) synonymized *Herulia* without explanation under *Sphegilla*. Later, after examination of the holotype of *H. sundholmi*, Schauff (1984) synonymized *Herulia* under *Camptoptera*. He was correct in his placement only if one treats *Macrocamptoptera* as a synonym of *Camptoptera*. We synonymize *Herulia* under *Macrocamptoptera*; its type species, *M. sundholmi*, is very similar to *M. metotarsa* (Girault) in size and structure. We examined the holotype of *Rhila* (UPPH) and transfer it to *Macrocamptoptera* as *M. bulgarica* (Donev). The close relationship of *Macrocamptoptera* to *Camptopteroides* is re-enforced by the peculiar male from Costa Rica mentioned under *Camptopteroides* that has a wing shape resembling *Macrocamptoptera* but the long macrochaetae of *Camptopteroides*.

Stephanocampta Mathot
(Figs. 25–30, 61–66, 85, 86, 100–102, 114, 122)

Stephanocampta Mathot 1966: 219. Type species. *S. yaosekoensis* Mathot, by original designation. *Hadromymar* Yoshimoto 1990: **Syn. nov.** Type species. *H. masoni* Yoshimoto, by original designation.

Diagnosis. Body length ca. 0.35–0.65 mm. Occiput without a median vertical groove extending from foramen to vertex but with a curved transverse groove extending to lateral margin of head at about mid-eye height (Fig. 29). Mandible apparently 1-toothed (Fig. 30). Female funicle 7-segmented with F2 either subequal to remaining segments or ring-like; male flagellum 10-segmented with F1 about half as long as F3, and F2 and apparently F4 ring-like (only one male, in CNCI, from Costa Rica was seen). Procoxae anteriorly almost abutting (Figs. 63–65). Prosternum anteriorly pointed (Figs. 63–65). Scutellum without transverse row of fovea (Fig. 61). Forewing relatively broad, especially towards apex, and slightly curved, with numerous setae on disc (Fig. 114). Proximal macrochaeta present but distinctly shorter than distal macrochaeta (Fig. 114). Tarsi 5-segmented. Propodeum at least half as long as scutellum, with a set of rigid translucent membranous lamellae (Figs. 61–64, 66) somewhat resembling those found in *Ptilomymar* Annecke and Doutt. Petiole short, surrounded ventrally and laterally by translucent lacey collar extending out from base of gaster (Figs. 85, 86, 100–102).

Biology. Unknown.

Distribution. Afrotropical (Congo, Madagascar, Rwanda, Tanzania), Oriental (Indonesia, Malaysia), Nearctic (USA – Florida) and Neotropical regions (Costa Rica south to Brazil).

Included species. *S. yaosekoensis*, *S. masoni*, **comb. nov.** from *Hadromymar*.

Specimens of a species from Gabon (CNCI) have a relatively narrow translucent membrane on the propodeum somewhat as in *Stephanocampta*, but have narrow wings and a short F2 not quite as narrow as in most *Camptoptera*. They do not fit well in *Stephanocampta* and may represent just an aberrant *Camptoptera*. However, we prefer not assign them to a genus here, pending further study of the generic limits of *Camptoptera*.

Discussion. We synonymize *Hadromymar* under *Stephanocampta* because both nominal genera have the same, characteristic propodeal and gastral lamellae and relatively broad forewings. *Stephanocampta* is yet another genus of the group in which F2 of females may be normal or ring-like.

Conclusions

The results of this study illustrates weaknesses in the classification of mymarids as presented by previous workers.

First, the reduction of tarsomeres in Mymaridae from five to four has occurred in different ways and is not a unique occurrence. In *Eofoersteria* the reduction is a result of fusion of the apical two segments and not an outright loss as is apparently the case in other, unrelated genera with four tarsomeres. At least one subfamily classification (Debauche 1948) was based on the supposition that this change occured only once. At the generic level, change in the number of funicular segments of females or flagellar segments of males is also insufficient grounds for defining or proposing new genera unless well supported by changes in other characters. For example, at least three of the *Camptoptera*-group genera, *Camptoptera*, *Camptopteroides*, and *Stephanocampta*, have either 6 or 7 funicular segments in females. When 7 are present the relative length of F2 may vary from ringlike to normal as in *Camptoptera*, *Stephanocampta*, and *Callodicopus*.

Second, the nature of the gastral petiole was portrayed in an overly simplistic manner in previous classifications. There appears to be more of a gradation in petiole length/width and the nature of attachment to the propodeum than was previously thought. Thus, in the *Camptoptera* group of genera the possibilities range from no visible petiole, with a relatively broad attachment of gaster to the propodeum (*Callodicopus*), to a petiole that is very narrow, slightly longer than wide, clearly distinct from the rest of the gaster, and with a relatively narrow attachment to the propodeum (as in *Camptoptera*).

Third, a given genus of Mymaridae is rarely restricted to only one major geographic region. Much more often a genus is found to occur in at least two and often most regions, a fact not fully appreciated by previous workers. Thus, to avoid creating inadvertent synonyms, new genera should be described only after studying a diversity of species from all related genera, regardless of their provenance. The relatively numerous synonymies proposed here are a result of examining material from all major zoogeographic regions.

Finally, because most species within the *Camptoptera*-group of genera are small to minute many more new species will likely be found. Their discovery will undoubtedly lead to a better definition of *Camptoptera* at least, and perhaps proposal of yet more genera within the group. Until a more thorough knowledge of the diversity of *Camptoptera* species is obtained, based on study of greater numbers of good slide-mounted specimens, its generic limits, at least, will remain unclear. Similarly, the generic limits of the remaining genera may again have to be modified.
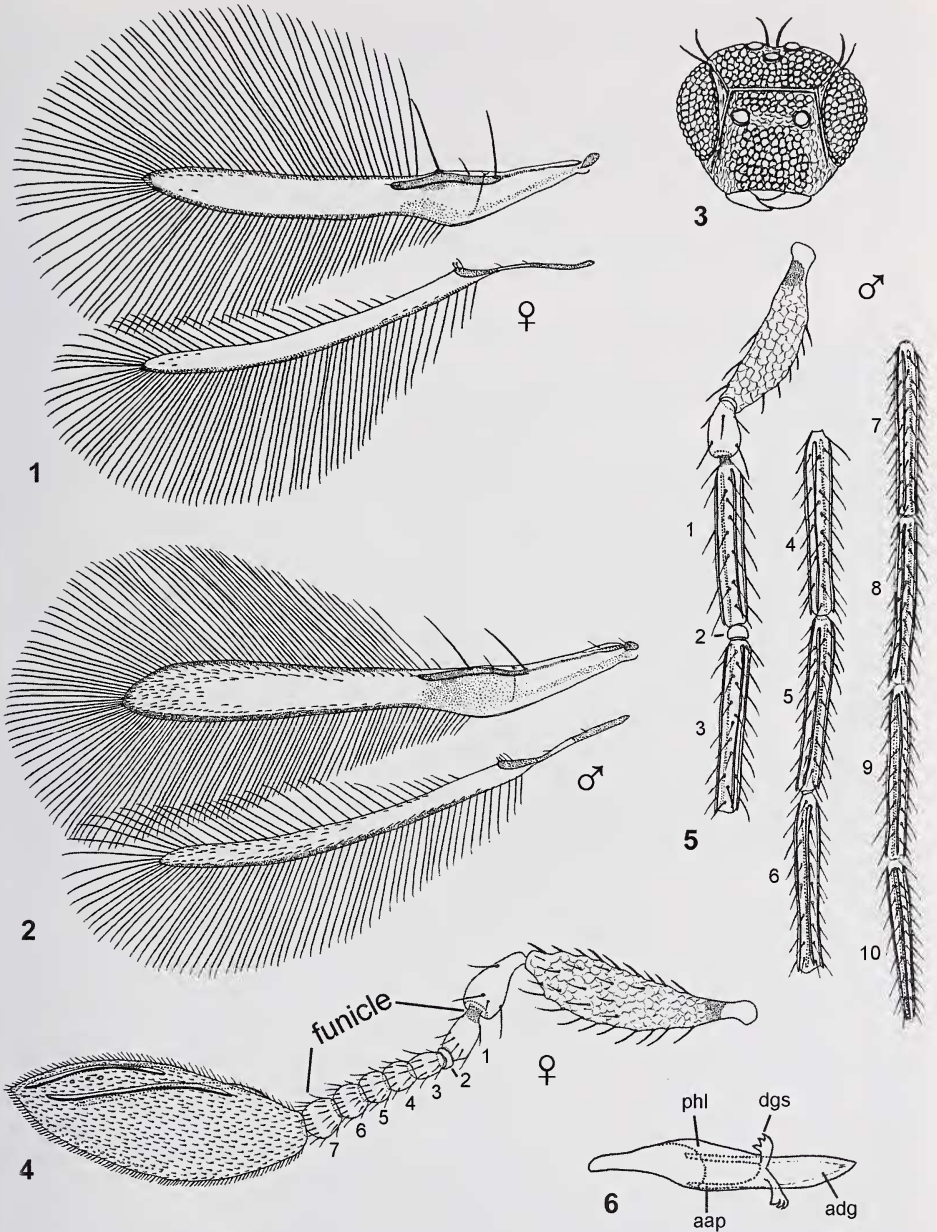
FIGURES 1–6. *Camptopteroides* (*Camptopteroides*) *alata* Lin. 1, ♀ wings; 2, ♂ wings; 3, head; 4, ♀ antenna; 5, ♂ antenna; 6, ♀ genitalia. Abbreviations: adg = aedeagus, dgs = digital spines, phl = phallobase.
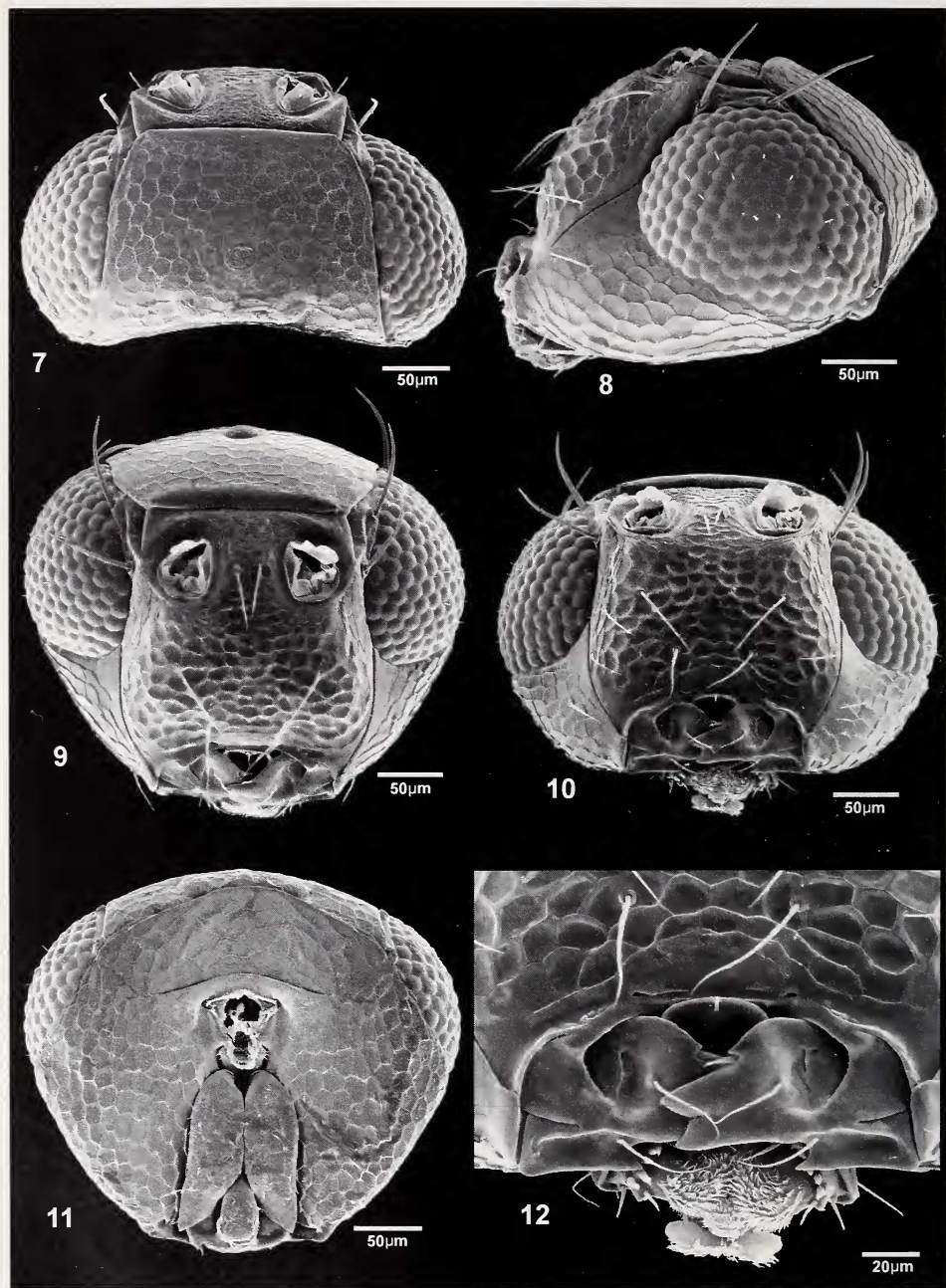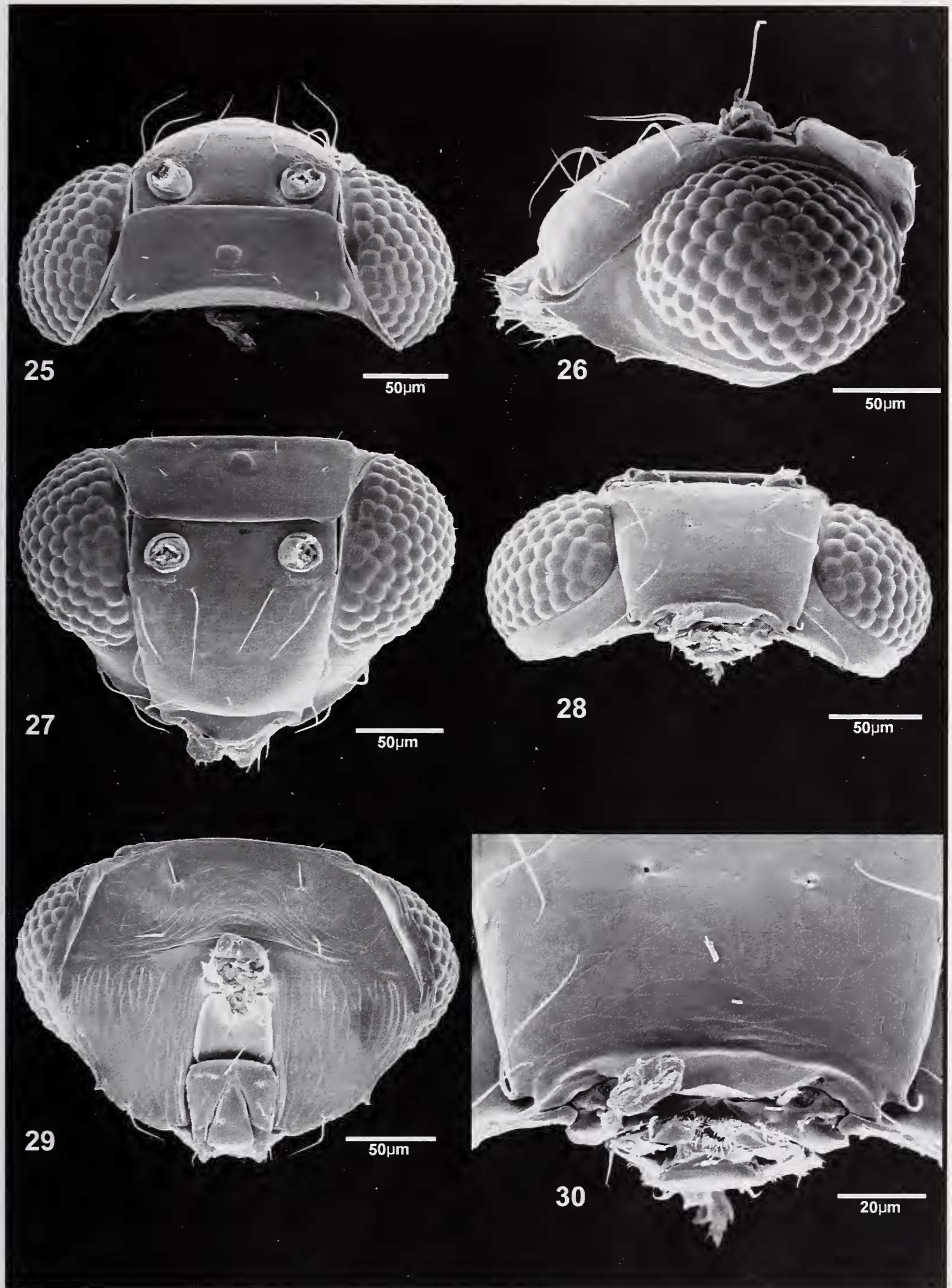
FIGURES 7–12. *Camptopteroides* (*Camptopteroides*) sp., Australia, Queensland, Mt. Lewis. 7–11, head: 7, dorsal; 8, lateral; 9, anterior; 10, ventral; 11, posterior; 12, mouthparts.
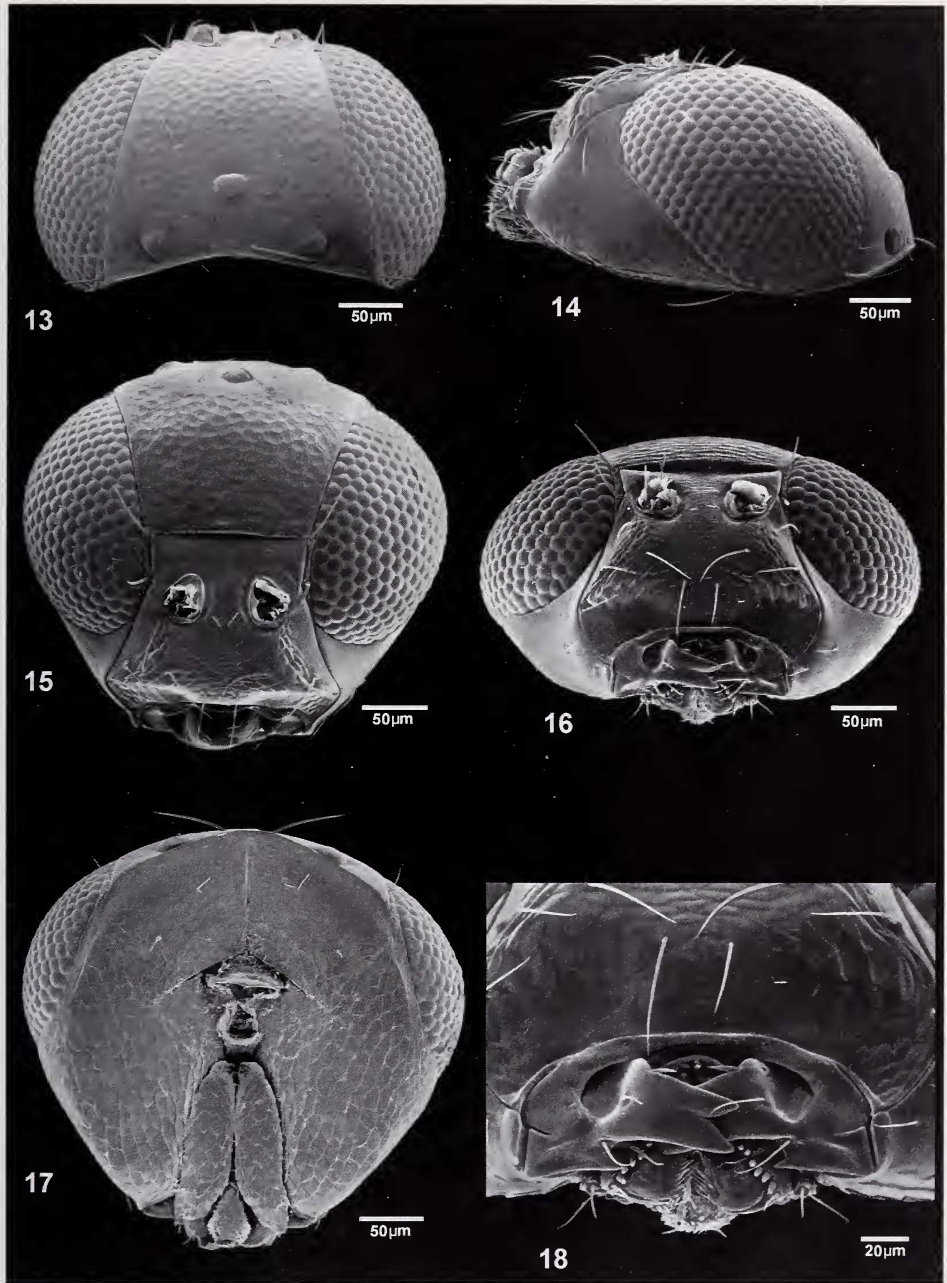
FIGURES 13–18. *Camptopteroides* (*Alalinda*) spp., Costa Rica, Limón, and Ecuador, Sucumbios, Sacha Lodge. 13–17, head: 13, dorsal; 14, lateral; 15, anterior, 16, ventral; 17, posterior; 18, mouthparts.
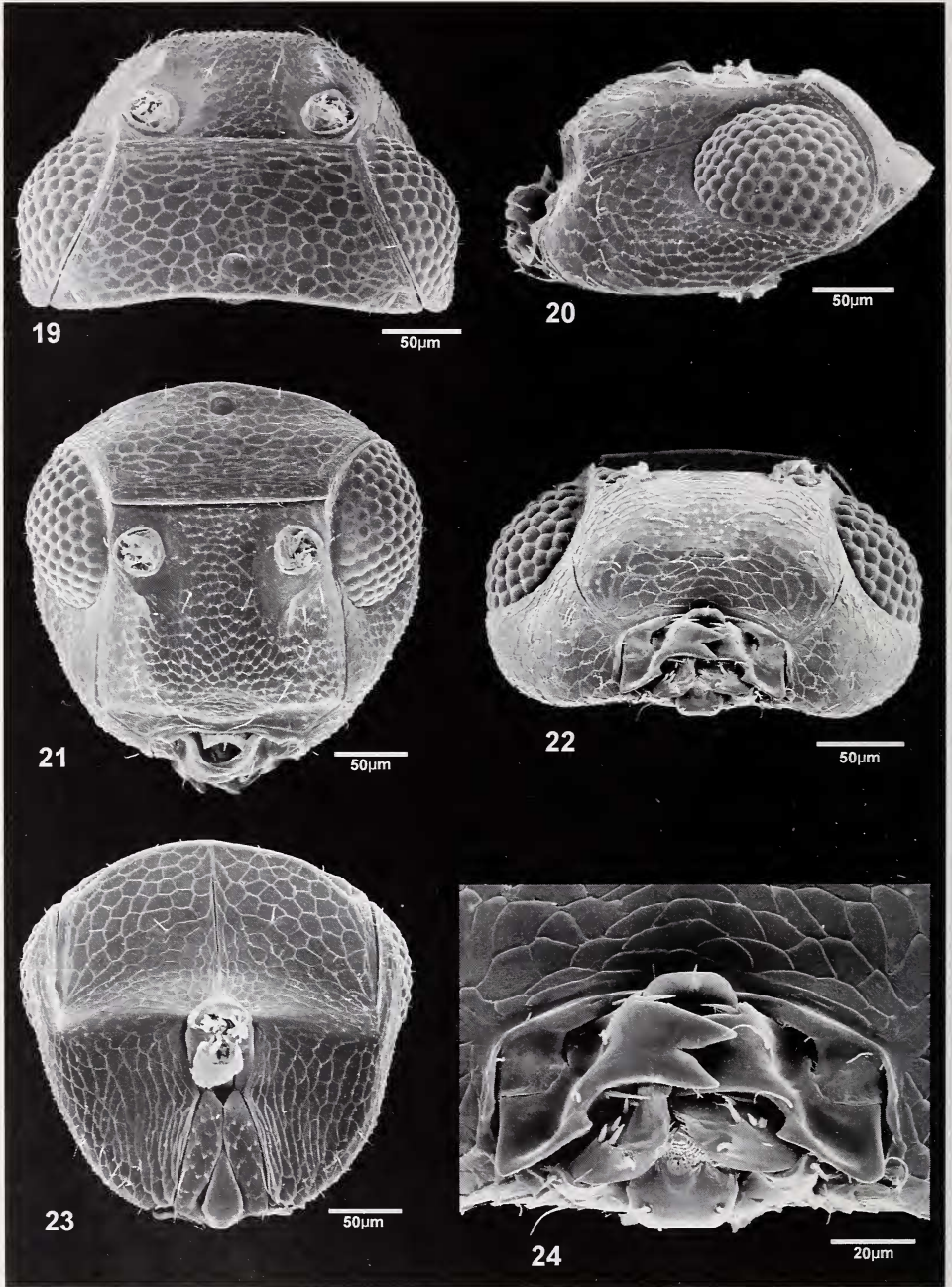
FIGURES 19–24. *Macrocamptoptera metotarsa* (Girault), USA, SC, Pendleton. 19–23, head: 19, dorsal; 20, lateral; 21, anterior, 22, ventral; 23, posterior; 24, mouthparts.

FIGURES 25–30. *Stephanocampta* sp., Ecuador, Napo, Sierra Azul. 25–29, head: 25, dorsal; 26, lateral; 27, anterior; 28, ventral; 29, posterior; 30, mouthparts.
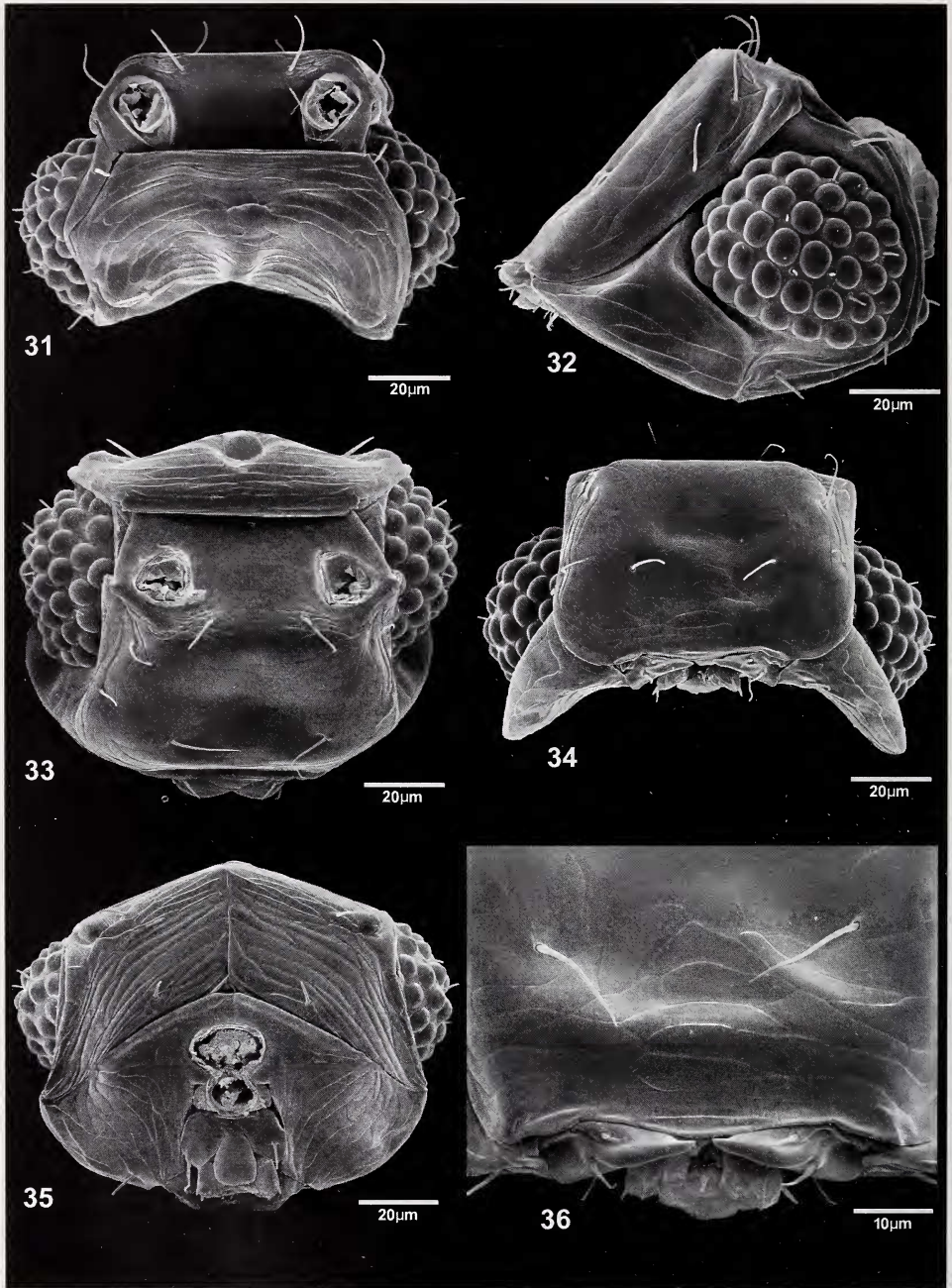
FIGURES 31–36. *Camptoptera* sp. USA, FL, Monroe Co., No Name Key. 31–35, head: 31, dorsal; 32, lateral; 33, anterior; 34, ventral; 35, posterior; 36, mouthparts.
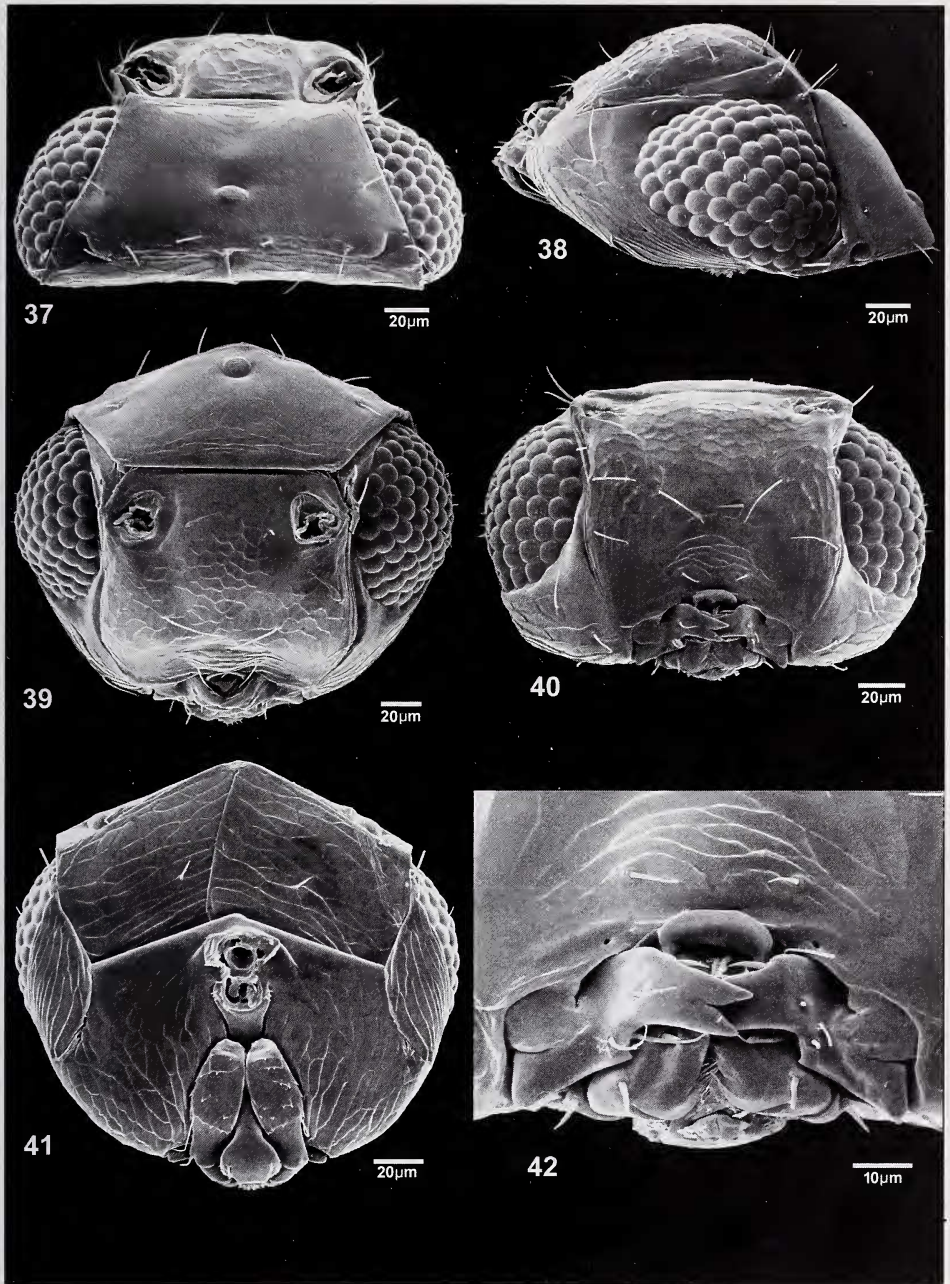
FIGURES 37–42. *Callodicopus* sp. Costa Rica, Guanacaste, Santa Rosa National Park. 37–41, head: 37, dorsal; 38, lateral; 39, anterior; 40, ventral; 41, posterior; 42, mouthparts.
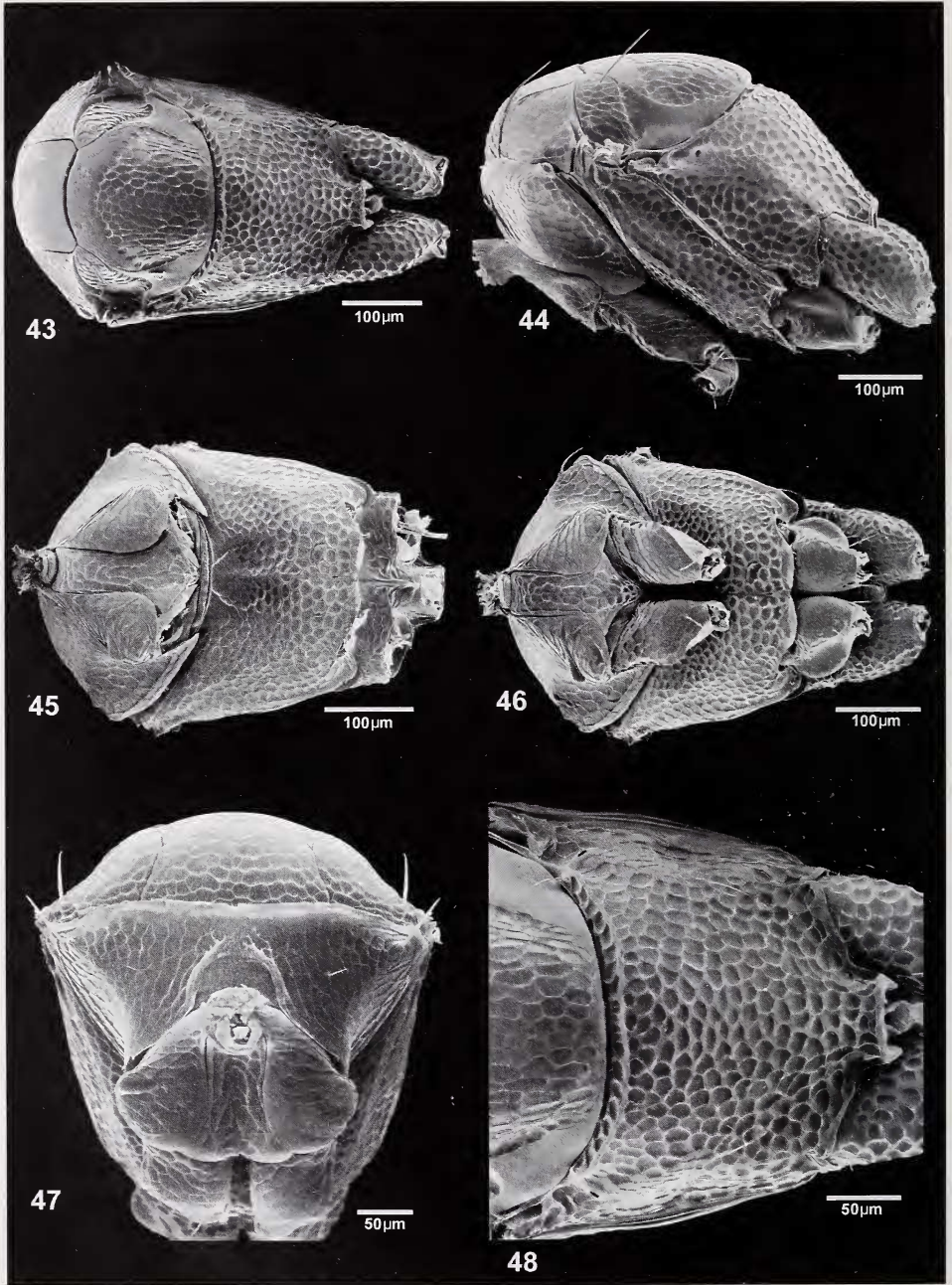
FIGURES 43–48. *Camptopteroides* (*Camptopteroides*) sp. Australia, Queensland, Mt. Lewis. 43–47, mesosoma: dorsal; 44, lateral; 45, 46, ventral, without and with coxae; 47, anterior; 48, propodeum, dorsal.
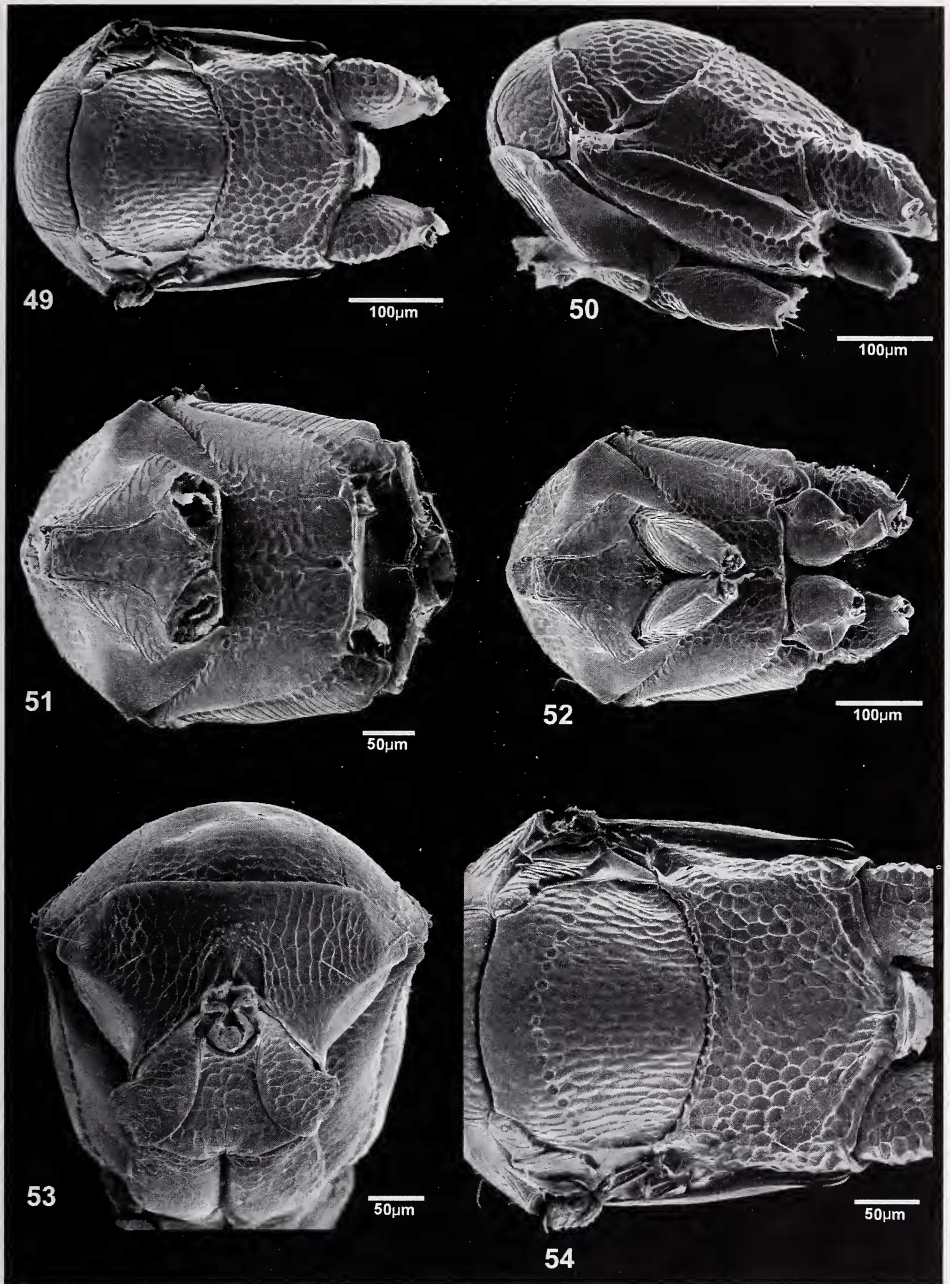
FIGURES 49–54. *Camptopteroides* (*Alalinda*) spp., Costa Rica, Limón and Carthago, and Ecuador, Sucumbios, Sacha Lodge. 49–53, mesosoma: 49, dorsal; 50, lateral; 51, 52 ventral, without and with coxae; 53, anterior; 54, propodeum, dorsal.
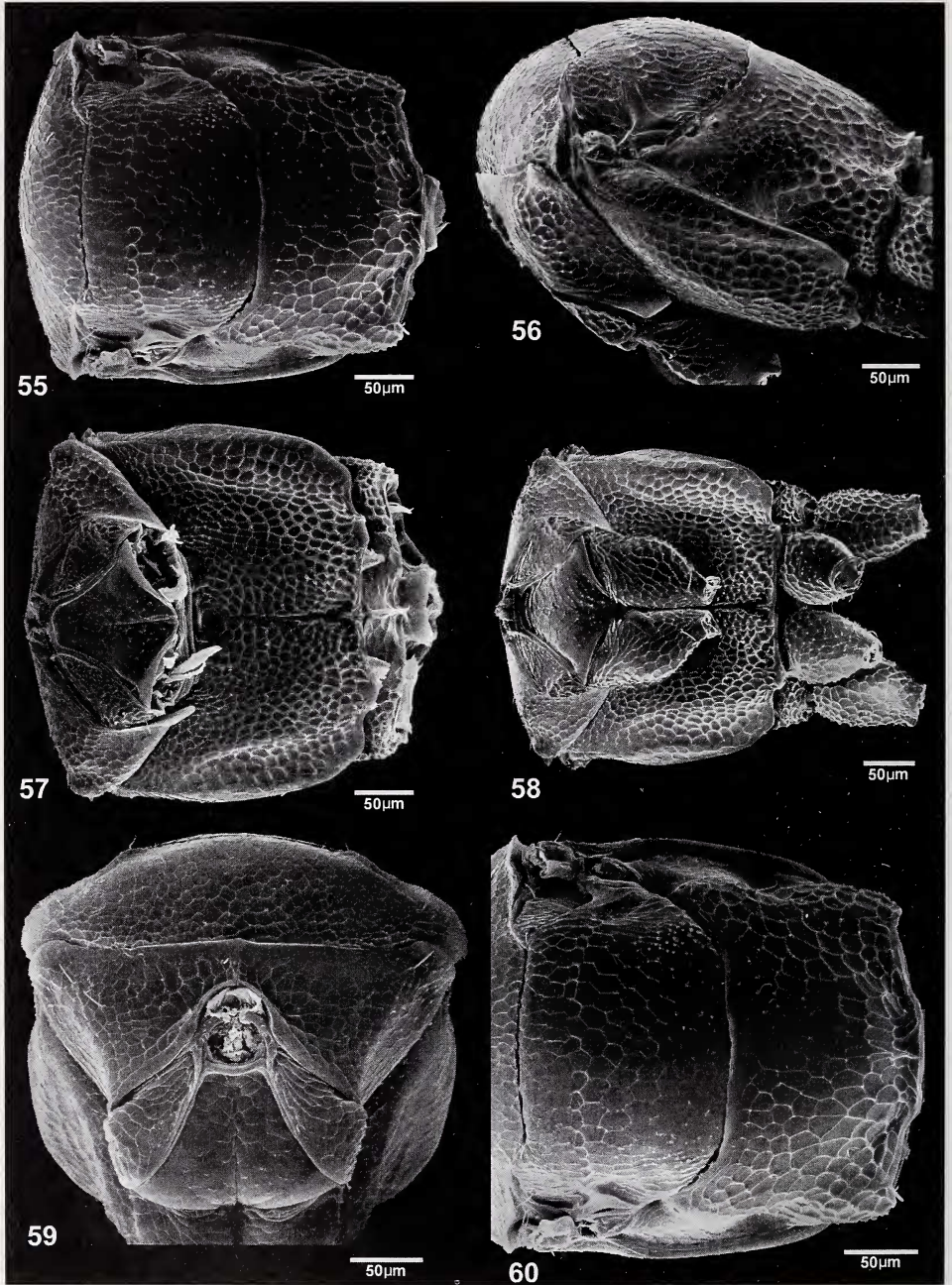
FIGURES 55–60. *Macrocamptoptera metotarsa* (Girault), USA, SC, Pendleton. 55–59, mesosoma: 55, dorsal; 56, lateral; 57, 58, ventral, without and with coxae; 59, anterior; 60, propodeum, dorsal.
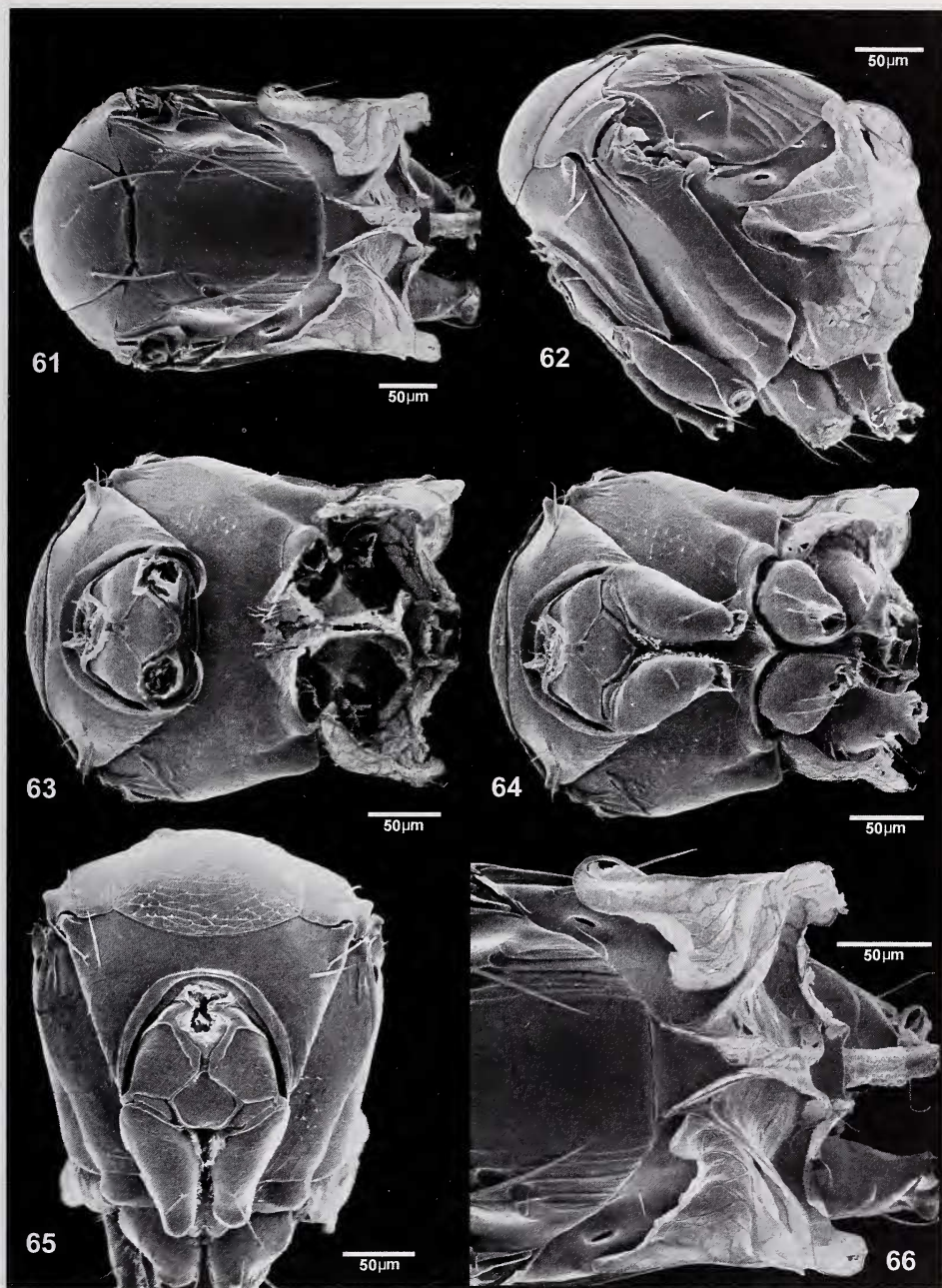
FIGURES 61–66. *Stephanocampta* sp., Ecuador, Napo, Sierra Azul. 61–65: 61, dorsal; 62, lateral; 63, 64, ventral, without and with coxae; 65, anterior; 66, propodeum, dorsal.
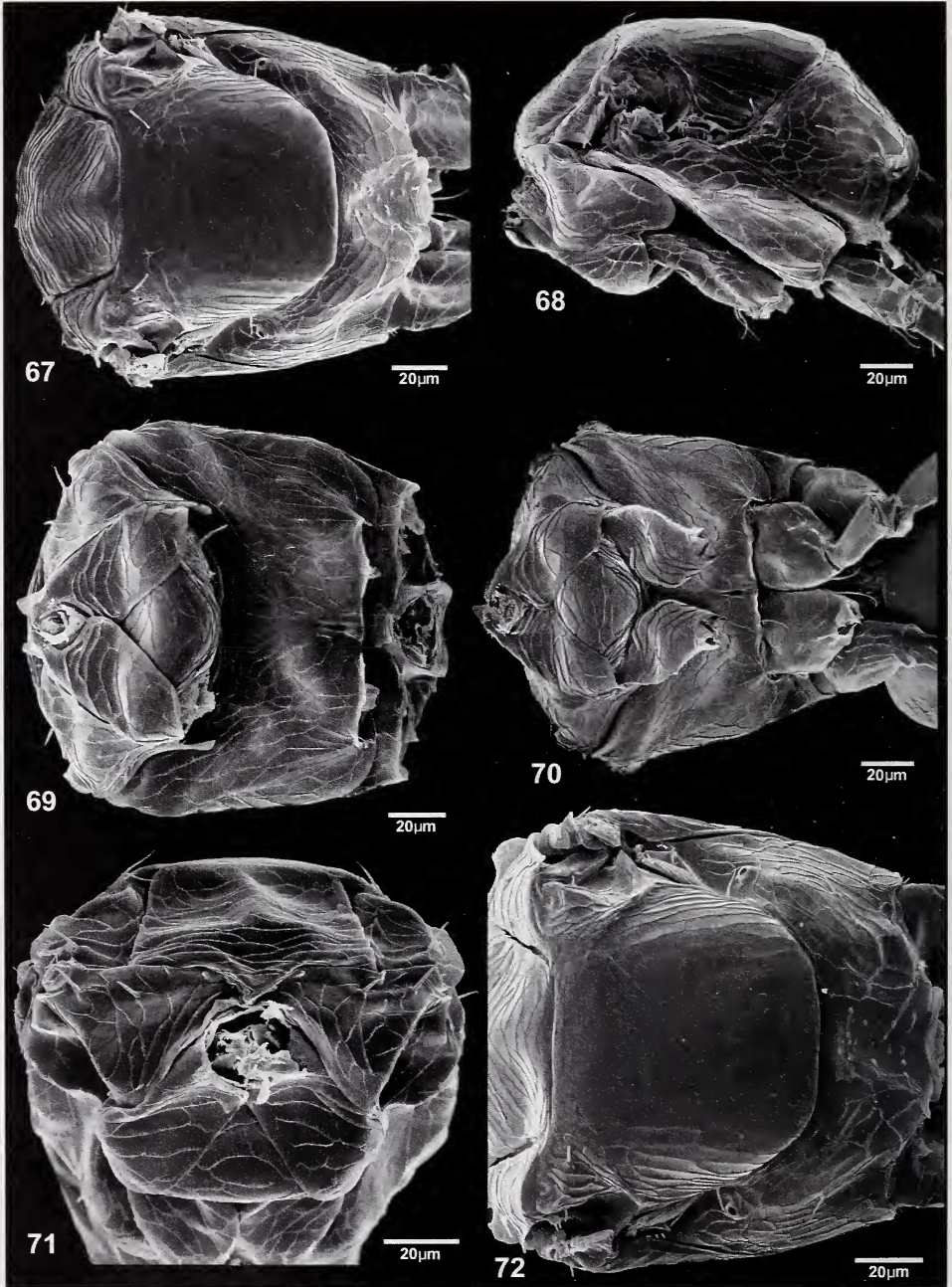
FIGURES 67–72. *Camptoptera* sp. USA, FL, Monroe Co., No Name Key. 67–71, mesosoma: 67, dorsal; 68, lateral; 69, 70, ventral, without and with coxae; 71, anterior; 72, propodeum, dorsal.
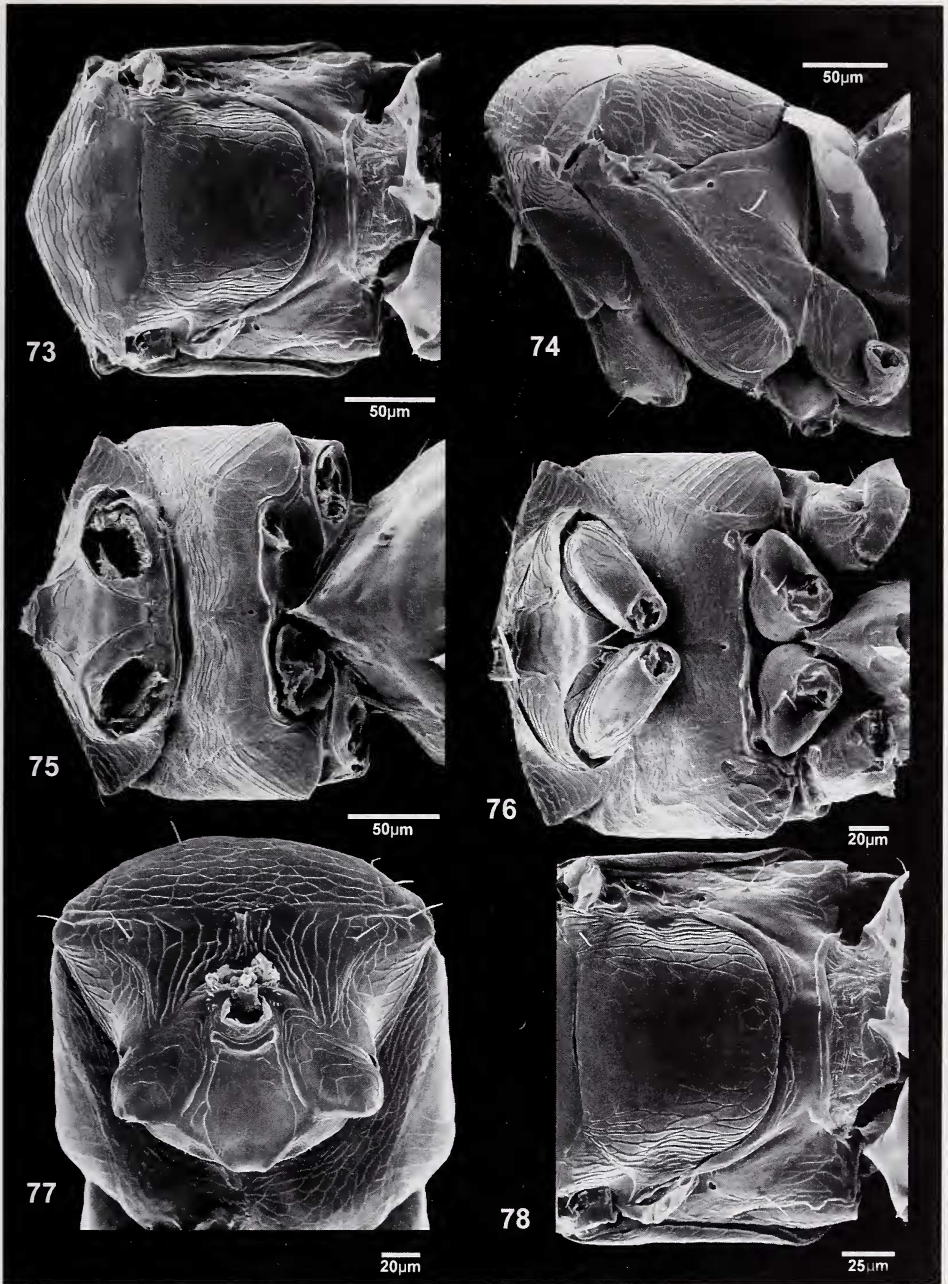
FIGURES 73–78. *Callodicopus* sp. Costa Rica, Guanacaste, Santa Rosa National Park. 73–77: 73, dorsal; 74, lateral; 75, 76, ventral, without and with coxae; 77, anterior; 78, propodeum, dorsal.
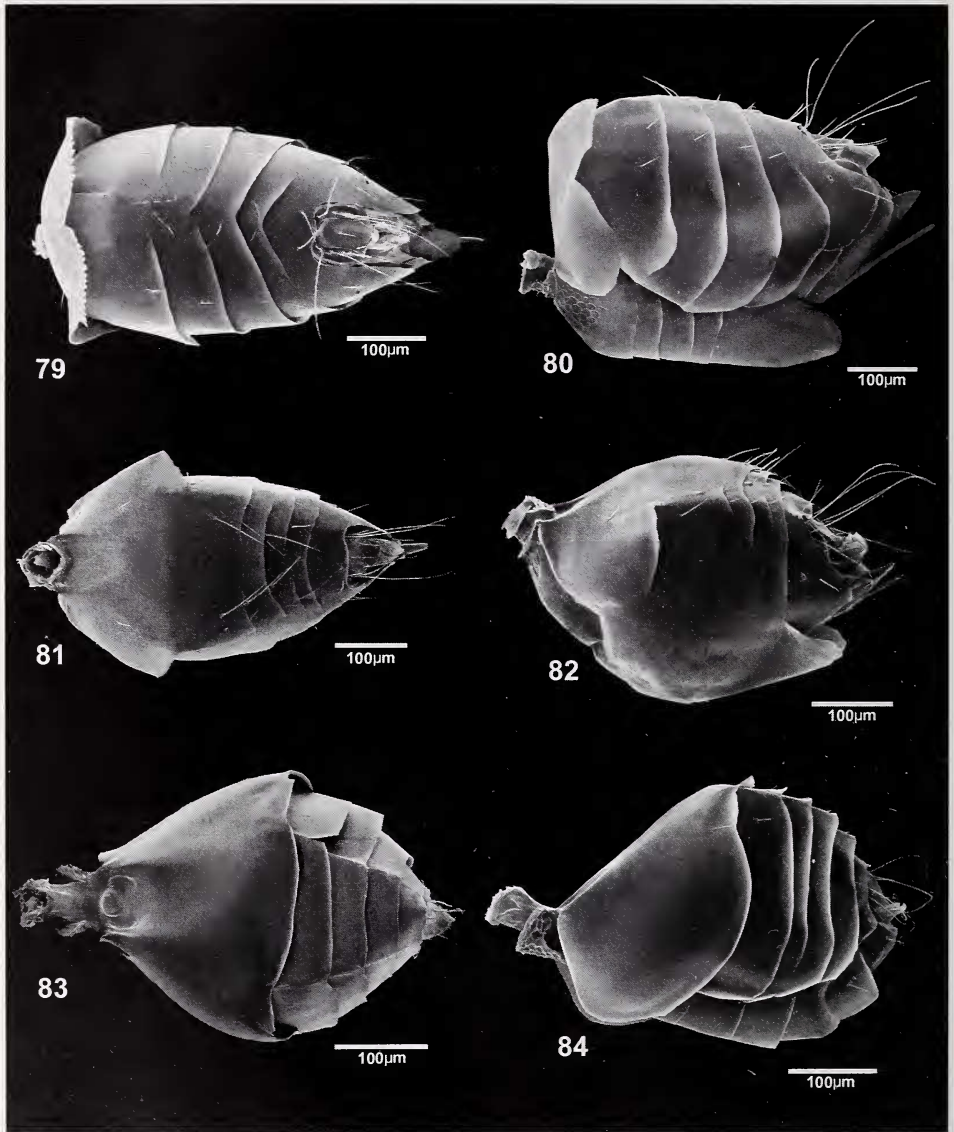
FIGURES 79–84. Metasoma. 79, 80, *Camptopteroides* (*Camptopteroides*), Australia, Queensland, Mt. Lewis. 79, dorsal; 80, lateral. 81, 82, *Camptopteroides* (Alalinda), Costa Rica, Limón, and Ecuador, Sucumbios, Sacha Lodge. 81, dorsal; 82, lateral. 83, 84, *Macrocamptoptera metotarsa* (Girault), USA, SC, Pendleton. 83, dorsal; 84, lateral.
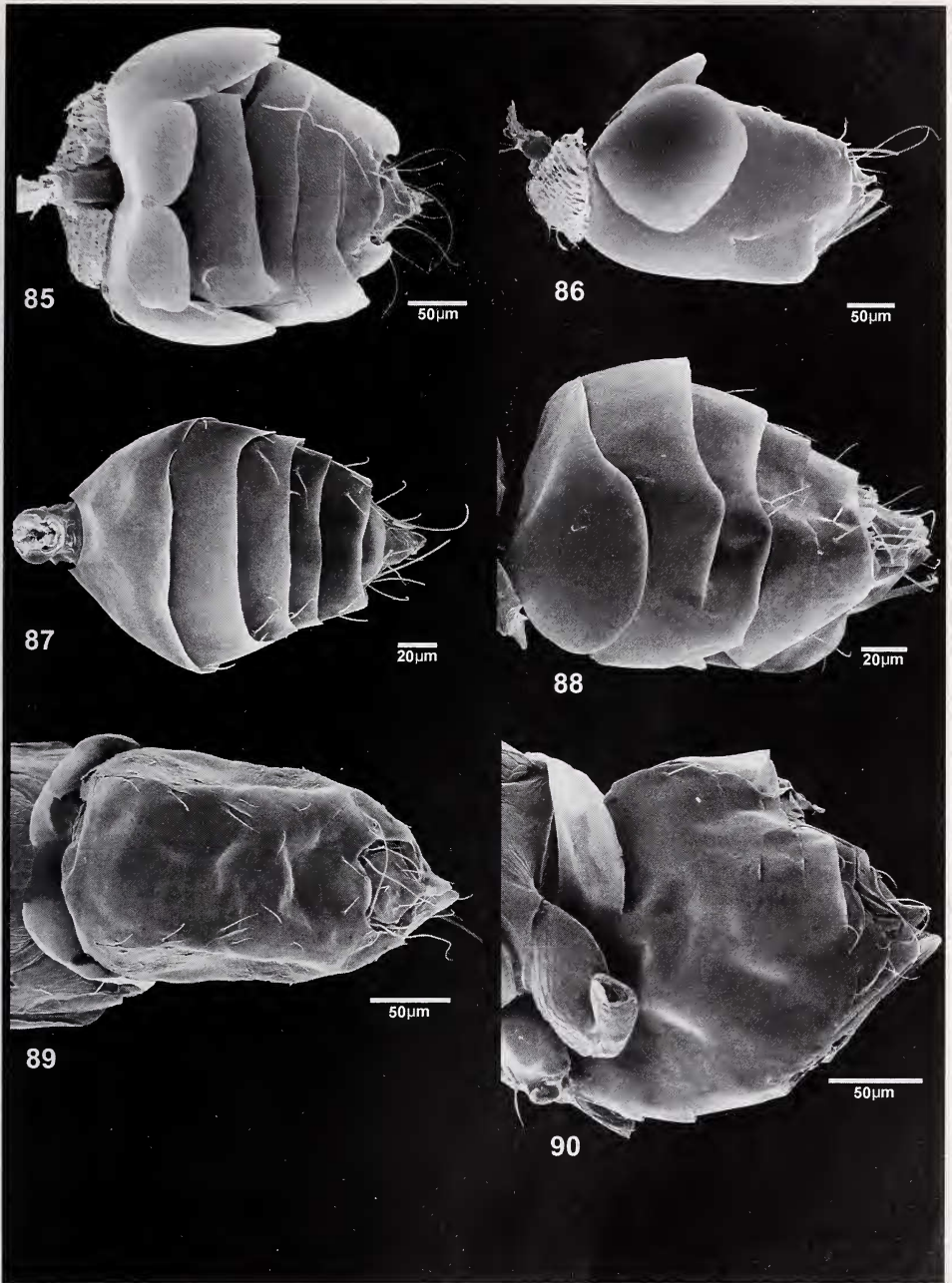
FIGURES 85–90. Metasoma. 85, 86, *Stephanocampta* sp., Ecuador, Napo, Sierra Azul. 85, dorsal; 86, lateral. 87, 88, *Camptoptera* sp. USA, FL, Monroe Co., No Name Key. 87, dorsal; 88, lateral. 89, 90, *Callodicopus* sp. Costa Rica, Guanacaste, Santa Rosa National Park. 89, dorsal; 90, lateral.
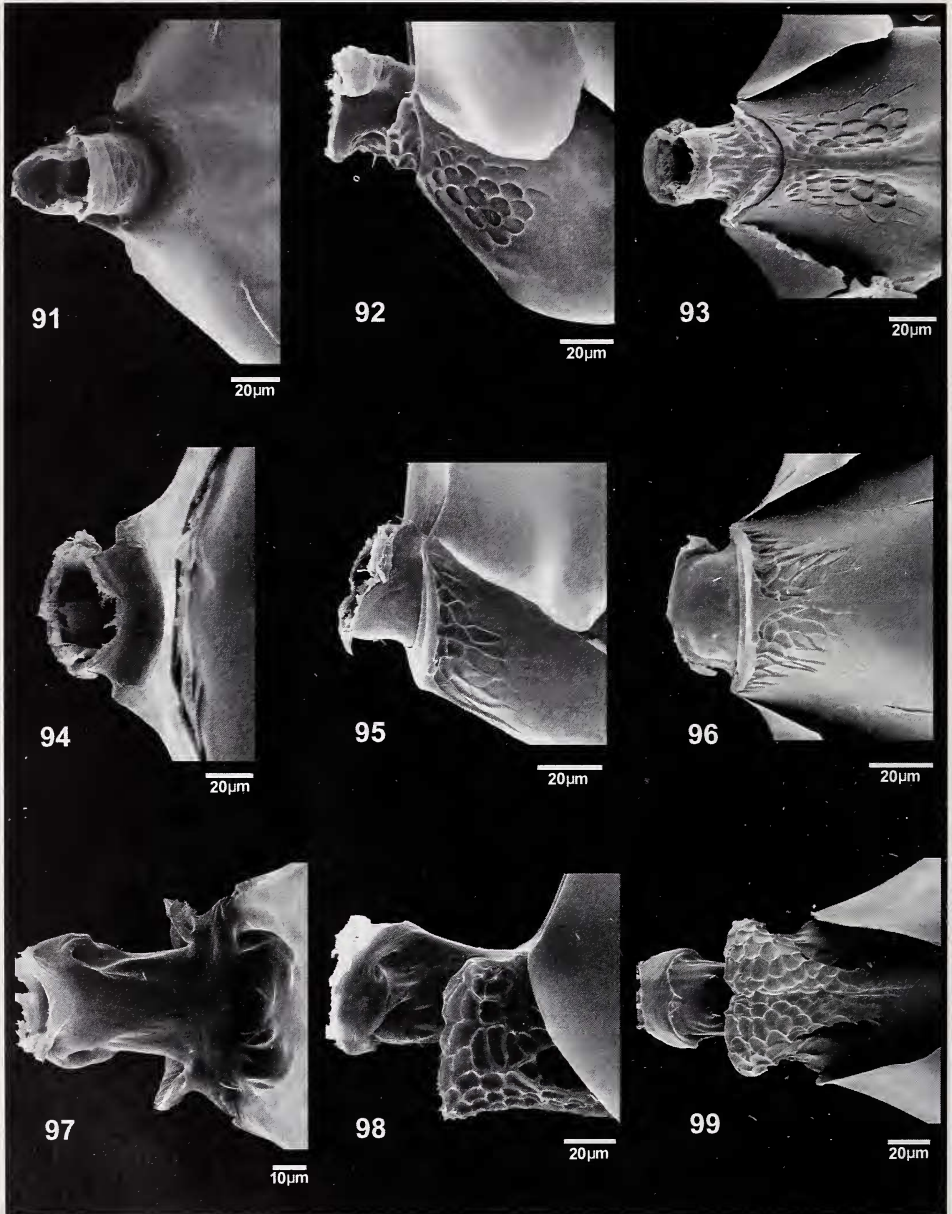
FIGURES 91–99. Gastral petiole. 91–93, *Camptopteroides* (*Camptopteroides*), Australia, Queensland, Mt. Lewis. 91, dorsal; 92, lateral; 93, ventral. 94–96, *Camptopteroides* (*Alalinda*), Costa Rica, Limón. 94, dorsal; 95, lateral; 96, ventral. 97–99, *Macrocamptoptera metotarsa* (Girault), USA, SC, Pendleton. 97, dorsal; 98, lateral; 99, ventral.
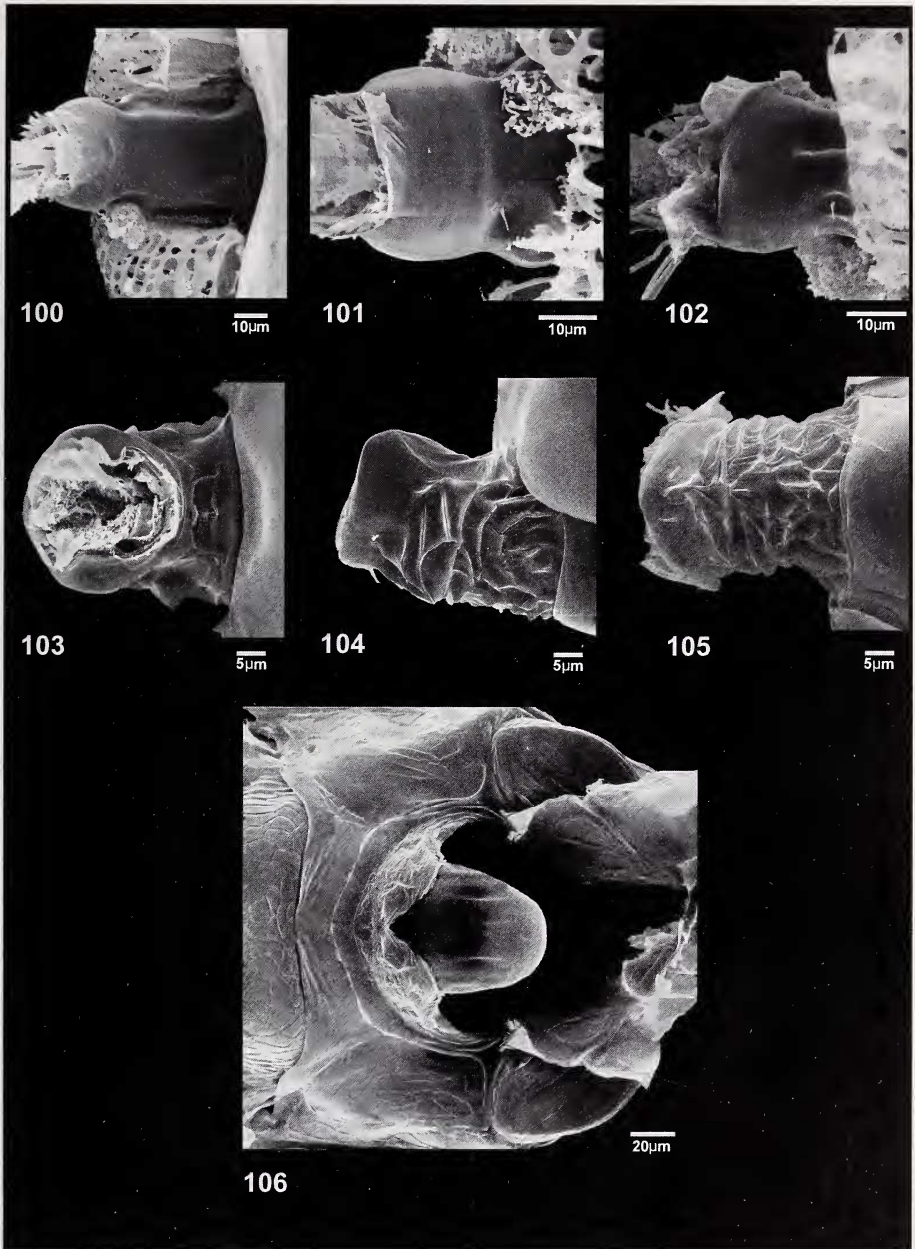
FIGURES 100–106. 100–105, gastral petiole. 100–102, *Stephanocampta* sp., Ecuador, Napo, Sierra Azul. 100, dorsal; 101, lateral; 102, ventral. 103–105, *Camptoptera* sp. USA, FL, Monroe Co., No Name Key. 103, dorsal; 104, lateral; 105, ventral. 106, propodeum, propodeal foramen and apex of mesophgragma, *Callodicopus* sp. Costa Rica, Guanacaste, Santa Rosa National Park.
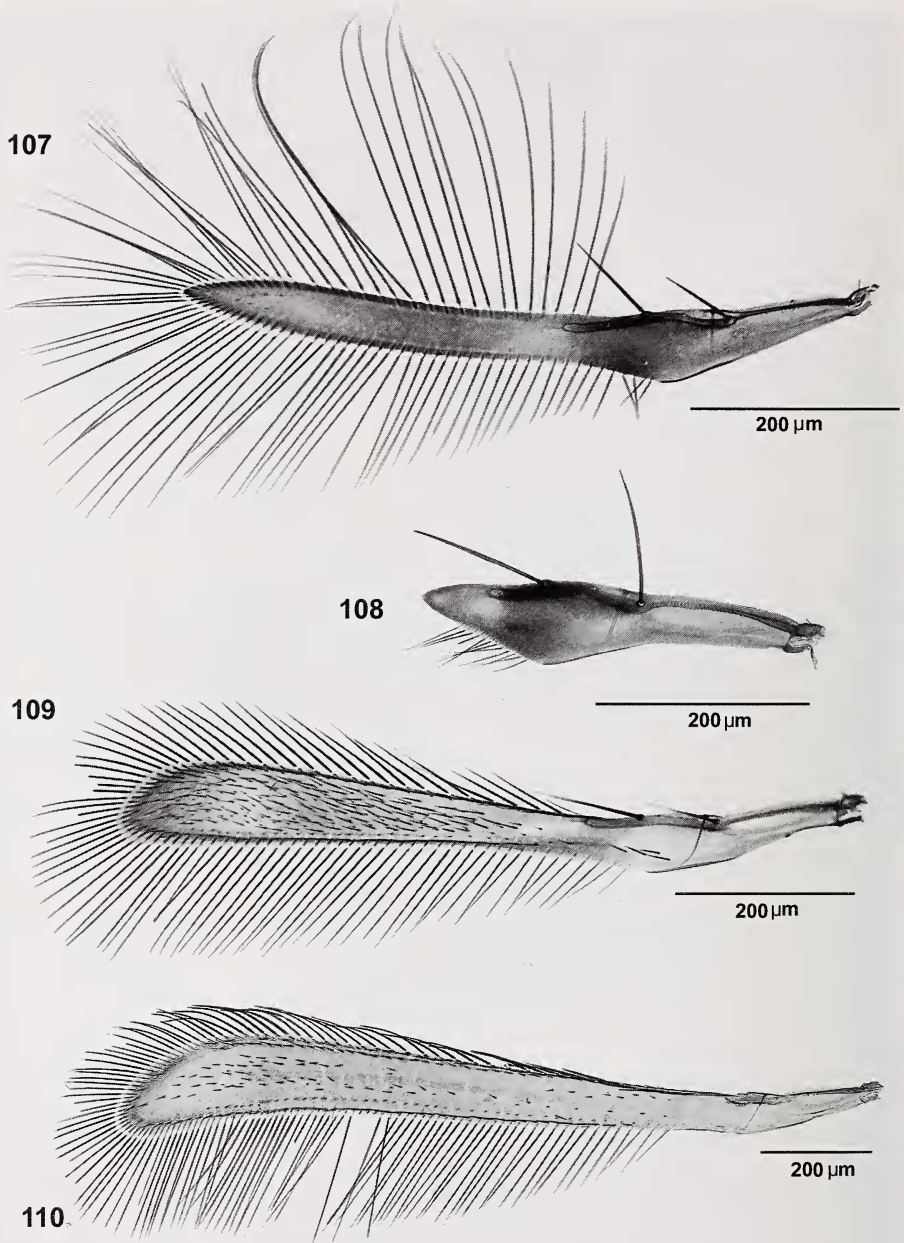
FIGURES 107–110. Forewings. 107, 108: *Camptopteroides* (*Camptopteroides*) spp. ♀, Malaysia, Sabah, Mt. Kinabalu National Park headquarters, macropterous and brachypterous specimens; 109, *Camptopteroides* (*Alalinda*) *dorothea* ♀, PARATYPE; 110, *Macrocamptoptera metotarsa* Girault, USA, SC, Anderson Co., Pendleton.
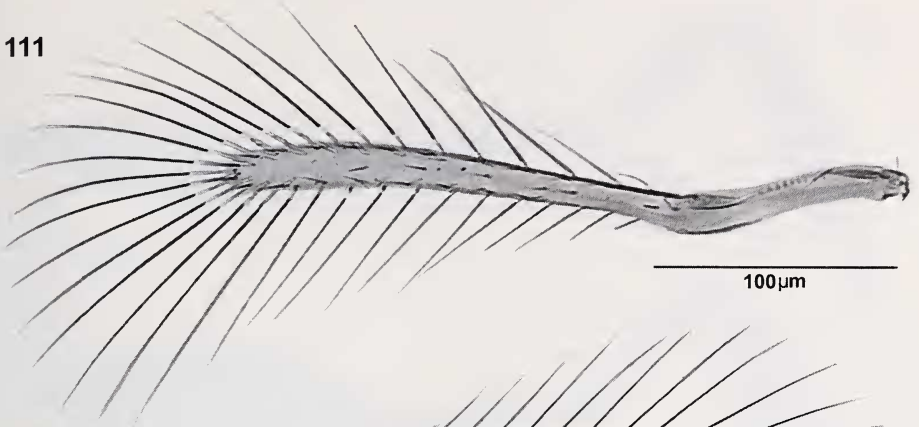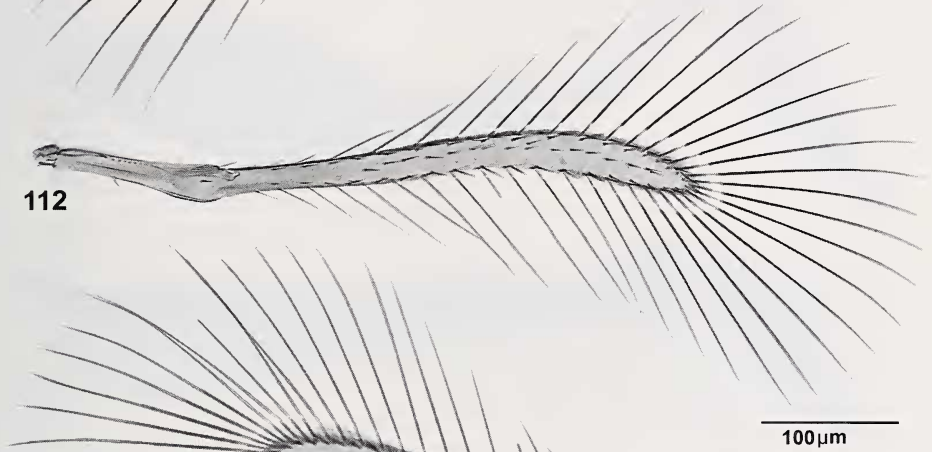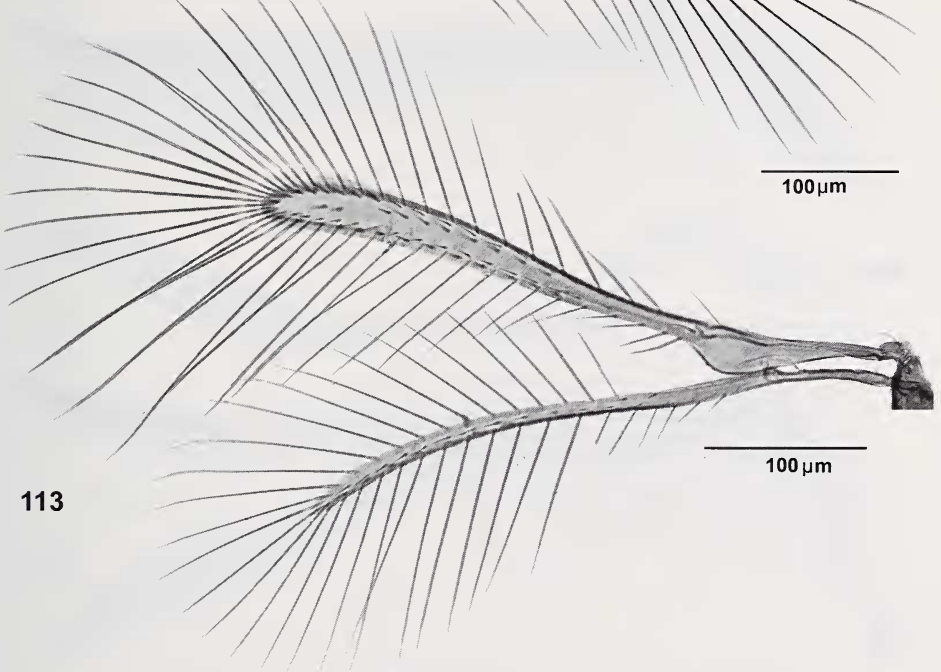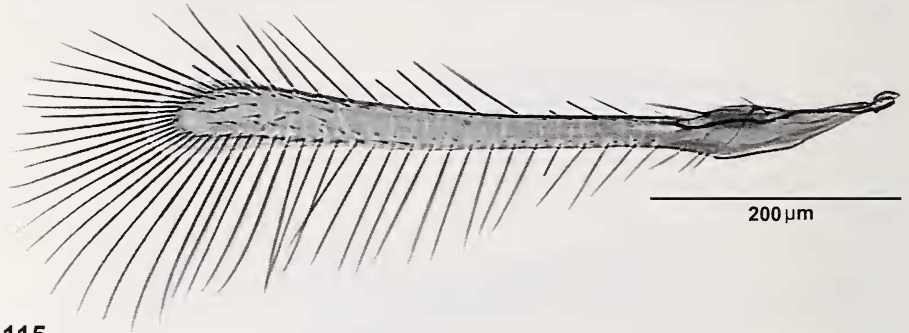
FIGURES 111–113. Wings. 111, *Eofoersteria* sp., USA, FL, Dade Co. Miami Deering Estate Park; 112, *Camptoptera* sp., Austria, Lower Austria, near Hainburg; 113, *Sphegilla* sp., Switzerland, Zurich, Uerlikon.
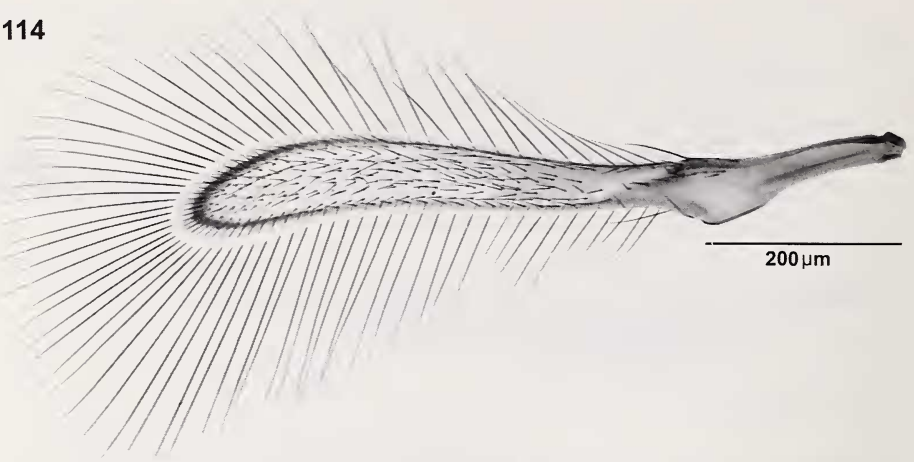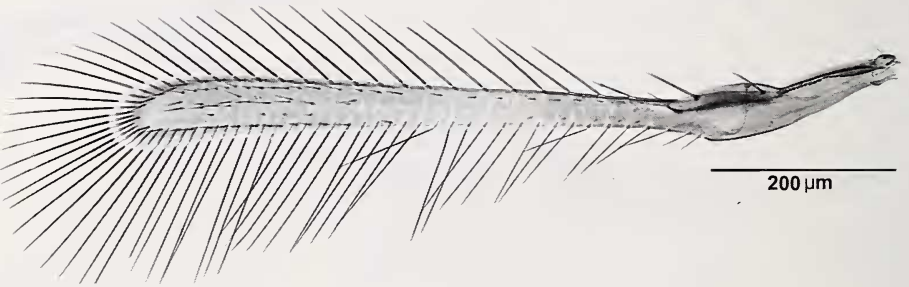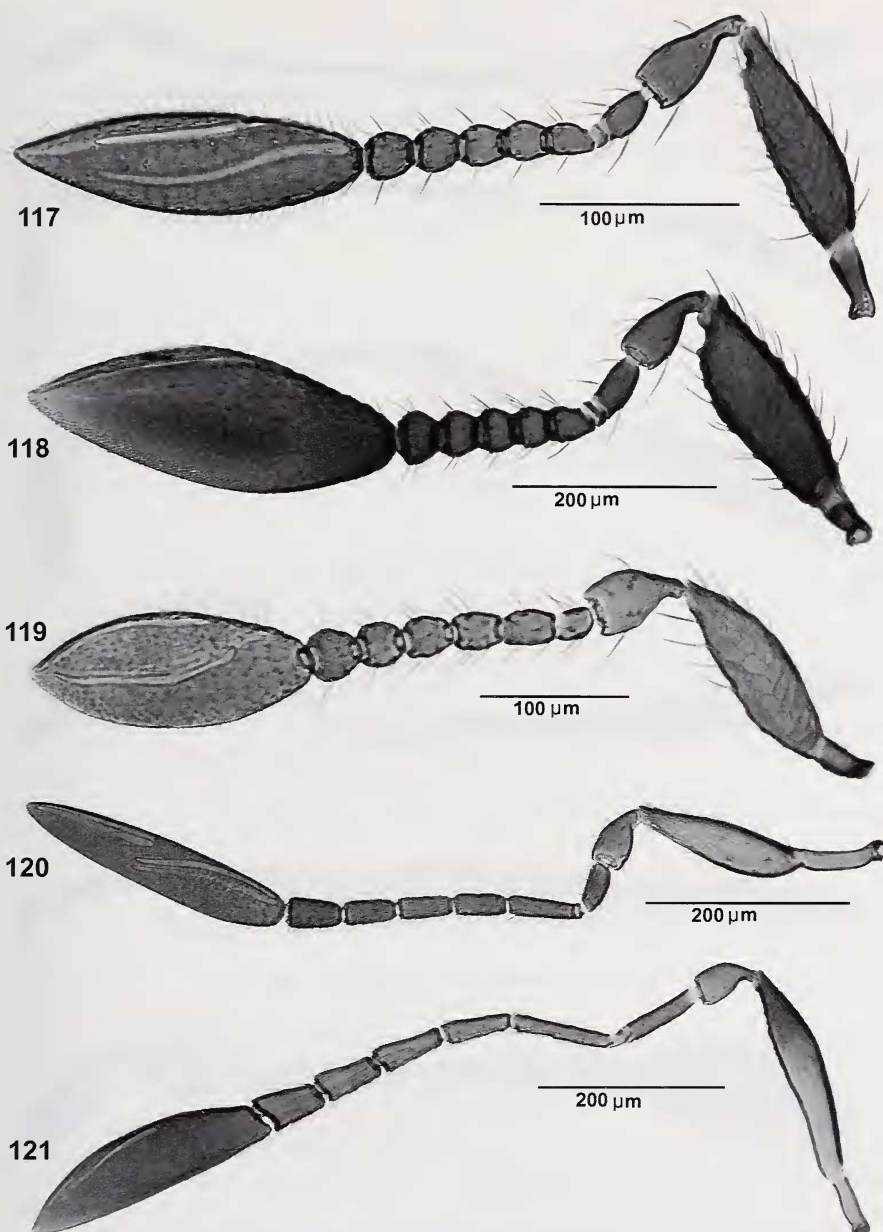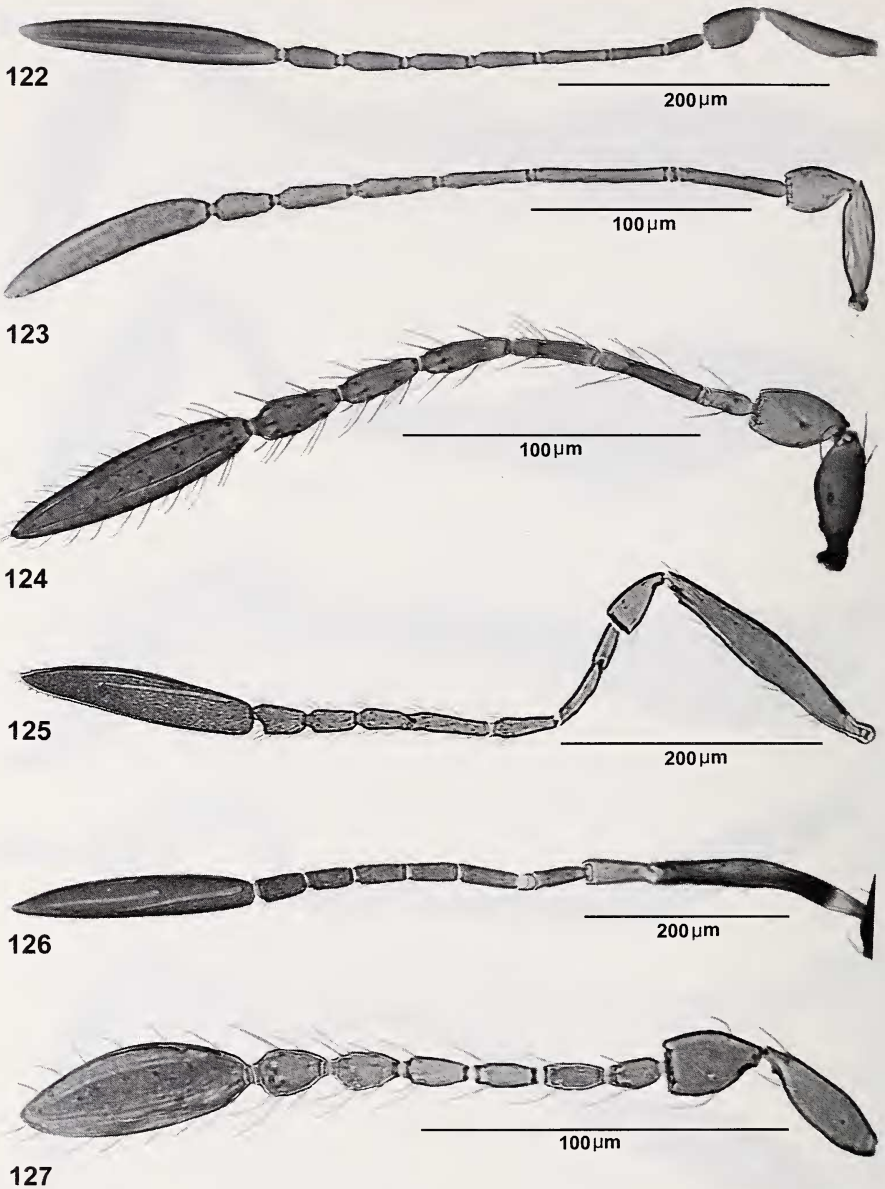
FIGURES 114–116. Forewings. 114, *Stephanocampta* sp., Costa Rica, Carthago, 4 km N. Cañon Genesis II; 115, *Callodicopus* sp., Costa Rica, Guanacaste, Santa Rosa National Park; 116, *Callodicopus magniclave* (Annecke) ♀, PARATYPE.

FIGURES 117–121. Female antennae. 117, 118, *Camptopteroides* (*Camptopteroides*) spp. ♀, Malaysia, Sabah, Mt. Kinabalu National Park headquarters, from macropterous and brachypterous specimens; 119, *Camptopteroides* (*Camptopteroides*) sp. ♀, Indonesia, Sulawesi, Kotamobagu, Gunung Muajat; 120; *Camptopteroides* (*Alalinda*) *dorothea* ♀, PARATYPE; 121, *Macrocamptoptera metotarsa* Girault, USA, SC, Anderson Co., Pendleton.

FIGURES 122–127. Female antennae. 122, *Stephanocampta* sp., Costa Rica, Carthago, 4 km N. Cañon Genesis II; 123, *Camptoptera* sp., Austria, Lower Austria, near Hainburg; 124, *Sphegilla* sp., Switzerland, Zurich, Uerlikon (clava originally separate, probably dorsal view); 125, *Callodicopus* sp., Costa Rica, Guanacaste, Santa Rosa National Park; 126, *Callodicopus magniclave* (Annecke) ♀ , PARATYPE (dorsal view); 127, *Eofoersteria* sp., USA, FL, Dade Co. Miami Deering Estate Park.

Acknowledgments

References

Annecke, D.P. 1961. Two new genera of Myridae [sic] from South Africa. Kudu, 4: 68–77.

Annecke, D.P. and R.L. Doutt. 1961. The genera of the Mymaridae. Hymenoptera: Chalcidoidea. Entomology Memoirs, Department of Agricultural Technical Services, Republic of South Africa, 5: 1–71.

Bolte, K.B. 1996. Techniques for obtaining scanning electron micrographs of minute arthropods. Proceedings of the Entomological Society of Ontario, 127: 67–87.

Dahms, E.C. 1984. A checklist of the types of Australian Hymenoptera described by Alexandre Arsene Girault: III. Chalcidoidea species F-M with advisory notes. Memoirs of the Queensland Museum, 21: 579–842.

Dahms, E.C. 1986. A checklist of the types of Australian Hymenoptera described by Alexandre Arsene Girault: IV. Chalcidoidea species N-Z and genera with advisory notes plus addenda and corrigenda. Memoirs of the Queensland Museum, 22: 319–739.

Debauche, H.R. 1948. Etude sur les Mymarommidae et les Mymaridae de la Belgique (Hymenoptera Chalcidoidea). Mémoires du Musée Royal d'Histoire Naturelle de Belgique, 108: 1–248.

Debauche, H.R. 1949. Mymaridae (Hymenoptera Chalcidoidea). Exploration du Parc National Albert. Mission G.F. de Witte (1933–35), 49: 1–105.

Donev, A. 1989. A new genus and species of the family Mymaridae from Bulgaria (Insecta, Hymenoptera, Chalcidoidea). Reichenbachia, 27(13): 79–83.

Dozier, H.L. 1932. Descriptions of new mymarid egg parasites from Haiti and Puerto Rico. Journal of the Department of Agriculture of Puerto Rico, 16: 81–91.

Dozier, H.L. 1933. Miscellaneous notes and descriptions of Chalcidoid parasites (Hymenoptera). Proceedings of the Entomological Society of Washington, 35: 85–100.

Förster, A. 1856. Hymenopterologische Studien. II. Heft. Chalcidiae und Proctotrupii. Aachen. 152 pp.

Ghesquière, J. 1942. Contribution à l'étude des hyménoptères du Congo belge. Revue de Zoologie et de Botanique Africaines, 36: 317–328.

Gibson, G.A.P. 1997. Chapter 2. Morphology and Terminology. pp.16–44 In G.A.P. Gibson, J.T. Huber and J.B. Woolley (eds) Annotated keys to the genera of Nearctic Chalcidoidea (Hymenoptera). NRC Research Press, Ottawa. 794 pp.

Girault, A.A. 1905. Two new Mymaridae. Psyche, 12: 91–92.

Girault, A.A. 1909. A monographic catalogue of the mymarid genus *Camptoptera* Foerster, with description of one new North American form. Annals of the Entomological Society of America, 2: 22–29.

Girault, A.A. 1910. Synonymic and descriptive notes on the chalcidoid family Mymaridae. Journal of the New York Entomological Society, 18: 233–259.

Girault, A.A. 1913. Australian Hymenoptera Chalcidoidea – II. Supplement. Memoirs of the Queensland Museum, 2: 107–129.

Girault, A.A. 1915. Australian Hymenoptera Chalcidoidea – II. Second supplement. Memoirs of the Queensland Museum, 3: 154–169.

Girault, A.A. 1916. Australian Hymenoptera Chalcidoidea. General supplement. Memoirs of the Queensland Museum, 5: 205–230.

Girault, A.A. 1917. Some new Mymaridae and a new *Signiphora* in the collections of the Zoological Museum, Berlin. Societas Entomologica, 32(5): 19–20.

Girault, A.A. 1918. Three new Australian chalcid flies. Redia, 13: 197–198.

Girault, A.A. 1920. New genera and species of Australian Mymaridae (Hymenoptera). Insecutor Inscitiae menstruus, 8: 96–100.

Girault, A.A. 1933. Some beauties inhabitant not of commercial boudoirs but of nature's bosom, notably new insects. Privately printed. 5 pp.

Hedqvist, K.-J. 1954. Zwei neue mymariden (Hym.) aus Schweden. Entomologisk Tidskrift, 75: 272–275.

Hedqvist, K.-J. 1956. A new species of *Camptoptera* from Norway (Hymenoptera, Mymaridae). Nordsk Entomologisk Tidsskrift B, 10(1): 37–39.

Hedqvist, K.-J. 1962. *Herulia* gen. n. *sundholmi* sp. n., eine neue Mymaridengattung mit einer neuen Art von Schweden (Hym. Chalcidoidea, Mymaridae. Opuscula Entomologica, 27: 103–105.

Huber, J.T. 1986. Systematics, biology, and hosts of the Mymaridae and Mymarommatidae (Insecta: Hymenoptera): 1758–1984. Entomography: An Annual Review for Biosystematics, 4: 185–243.

Huber, J.T. 1992. The subgenera, species groups, and synonyms of *Anaphes* (Hymenoptera: Mymaridae) with a review of the described Nearctic species of the *fuscipennis* group of *Anaphes* s.s. and the described species of *Anaphes* (Yungaburra). Proceedings of the Entomological Society of Ontario, 123: 23–110.

Huber, J.T. 1997. Chapter 14. Mymaridae. pp. 499–530 *In* G.A.P. Gibson, J.T. Huber and J.B. Woolley (eds) Annotated keys to the genera of Nearctic Chalcidoidea (Hymenoptera). NRC Research Press, Ottawa. 794 pp.

Kieffer, J.-J. 1902. Description de quelques cynipides nouveaux ou peu connus et de deux de leurs parasites (Hyménoptères). Bulletin de la Société d'Histoire Naturelle de Metz, 22: 1–18.

Kryger, J.P. 1950. The European Mymaridae comprising the genera known up to c. 1930. Entomologiske Meddelelser, 26: 1–97.

Mathot, G. 1966. Contribution à la connaissance des Mymaridae et Mymarommidae d'Afrique centrale (Hymenoptera Chalcidoidea). Bulletin & Annales de la Société Royale d'Entomologie de Belgique, 102: 214–239.

Mathot, G. 1969. Contribution à la connaissance des Mymaridae d'Europe et description d'espèces nouvelle (Hymenoptera: Chalcidoidea). Bulletin de l'Institut Royale des Sciences Naturelles de Belgique 45(7). 23 pp.

Mathot, G. 1972. Mymaridae nouveau d'Afrique central (2) (Hymenoptera). Revue de Zoologie et de Botanique Africaines, 85: 389–393.

Noyes, J.S. and E.W. Valentine. 1989. Mymaridae (Insecta: Hymenoptera) – introduction, and review of genera. Fauna of New Zealand No. 17. 95 pp.

Ogloblin, A.A. 1947. Las especies nuevas del género "*Camptoptera*" de Misiones (Mymaridae, Hym.). Acta Zoologica Lilloana, 4: 493–508.

Ogloblin, A.A. 1955. Los nuevos representantes de la fam. Mymaridae (Hym.) de la República Argentina. Bollettino del Laboratorio di Zoologia generale e agraria "Filippo Silvestri", Portici, 33: 377–397.

Ogloblin A.A. and D.P. Annecke. 1961. Some new Mymaridae from South Africa and Argentina in the genus *Camptoptera* Foerster (Hymenopt.: Chalcidoidea). Journal of the Entomological Society of Southern Africa, 24(2): 293–307.

Peck, O. 1951. Superfamily Chalcidoidea. pp. 410–594 *In* C.F.W. Muesbeck, K.V. Krombein and H.K. Townes (eds) Hymenoptera of America North of Mexico – synoptic catalog. Washington, DC. 1420 pp.

Perkins, R.C.L. 1912. Parasites of insects attacking sugar cane. Hawaiian Sugar Planters' Association, Experiment Station, Entomological Series, Bulletin No. 10. 27 pp.

Provancher, Abbé L. 1888. Suplément aux Additions aux Hyménoptères de la province de Québec. C. Darveau, Québec. pp. 346–438.

Risbec, J. 1952. Contribution à l'étude des Chalcidoïdes de Madagascar. Mémoires de l'Institut Scientifique de Madagascar, Série E, 2: 1–449.

Schauff, M.E. 1984. The Holarctic genera of Mymaridae (Hymenoptera: Chalcidoidea). Memoirs of the Entomological Society of Washington No. 12. 67 pp.

Soyka, W. 1946. Revision einiger Mymridengattungen. Zentralblatt für das Gesamtgebiet der Entomologie, 1 (2): 33–44.

Soyka, W. 1953. Die Gattung *Stichothrix* Förster. (Hym., Chalcid., Mymaridae). Natuurhistorisch Maandblad, 42: 57–60.

Soyka, W. 1961. Neue monographische Revision der *Camptoptera*-Gruppe mit den Gattungen *Camptoptera* Förster, *Stichothrix* Förster, *Macrocamptoptera* Girault und *Wertanekiella* n.g. (Mymaridae, Chalcidoidea, Hymenoptera). Publicatiës van het Natuurhistorish genootschap in Limburg, 12: 72–89.

Subba Rao, B.R. 1989. On a collection of Indian Mymaridae (Chalcidoidea: Hymenoptera). Hexapoda, 1: 139–186.

Taguchi, H. 1971. Mymaridae of Japan, I (Hymenoptera: Chalcidoidea). Transactions of the Shikoku Entomological Society, 11: 49–59.

Taguchi, H. 1972. Some new species of the genera *Camptoptera* and *Ptilomymar* from Bohol I., Philippines (Hymenoptera: Mymaridae). Kontyû, 40: 223–230.

Taguchi, H. 1977. Two new species of the genus *Camptoptera* from Taiwan (Hymenoptera: Mymaridae). Transactions of the Shikoku Entomological Society, 13: 143–146.

Viggiani, G. 1974. Ricerche sugli Hymenoptera Chalcidoidea XLII. Nuovi Mimaridi di Ceylon (*Camptopteroides armata*, n. gen. e n. sp., *Ptilomymar besucheti*, n. sp.). Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri", 31: 3–9.

Viggiani, G. 1978a. Una nueva specie di *Eofoersteria* Mathot (Mymaridae)(Ricerche sugli Hymenoptera Chalcidoidea: LV). Bollettino della Società Entomologica Italiana, 110: 39–41.

Viggiani, G. 1978b. New species of *Camptoptera* Förster (Hym. Mymaridae). Revue Suisse de Zoologie, 85: 151–156.

Viggiani, G. 1989. A preliminary classification of the Mymaridae (Hymenoptera: Chalcidoidea) based on the external male genitalic characters. Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri", 45: 141–148.

Viggiani, G. & R. Jesu. 1988. Considerazioni sui mimaridi italiani ed i loro ospiti (1). Atti dell'XV Congresso Nazionale Italiano di Entomologia, L'Aquila, 1988: 1019–1029.

Viggiani, G. & R. Jesu. 1993 [1995]. New species of Mymaridae from Cape Verde Islands (Hymenoptera: Chalcidoidea). Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri", 50: 93–107.

Yoshimoto, C.M. 1990. A review of the genera of New World Mymaridae (Hymenoptera: Chalcidoidea). Flora & Fauna Handbook No. 7. Sandhill Crane Press, Gainesville. 166 pp.

zur Strassen, R. 1950. Ein neuer Vertreter der Gattung *Camptoptera*. Senckenbergiana, 31: 145–150.